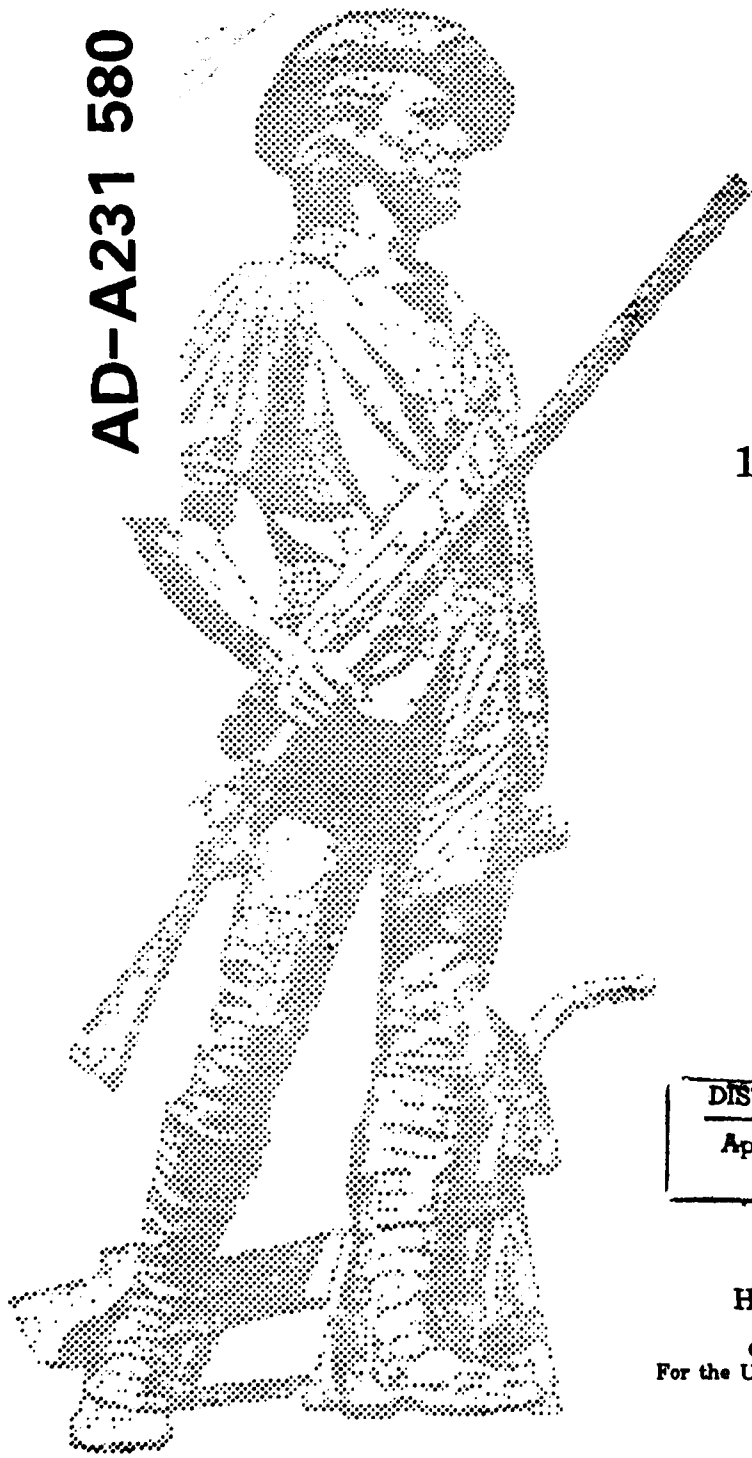


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INSTALLATION RESTORATION PROGRAM

AD-A231 580



Preliminary Assessment

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183rd Tactical Fighter Group
Illinois Air National Guard
Capital Airport
Springfield, Illinois

May 1990

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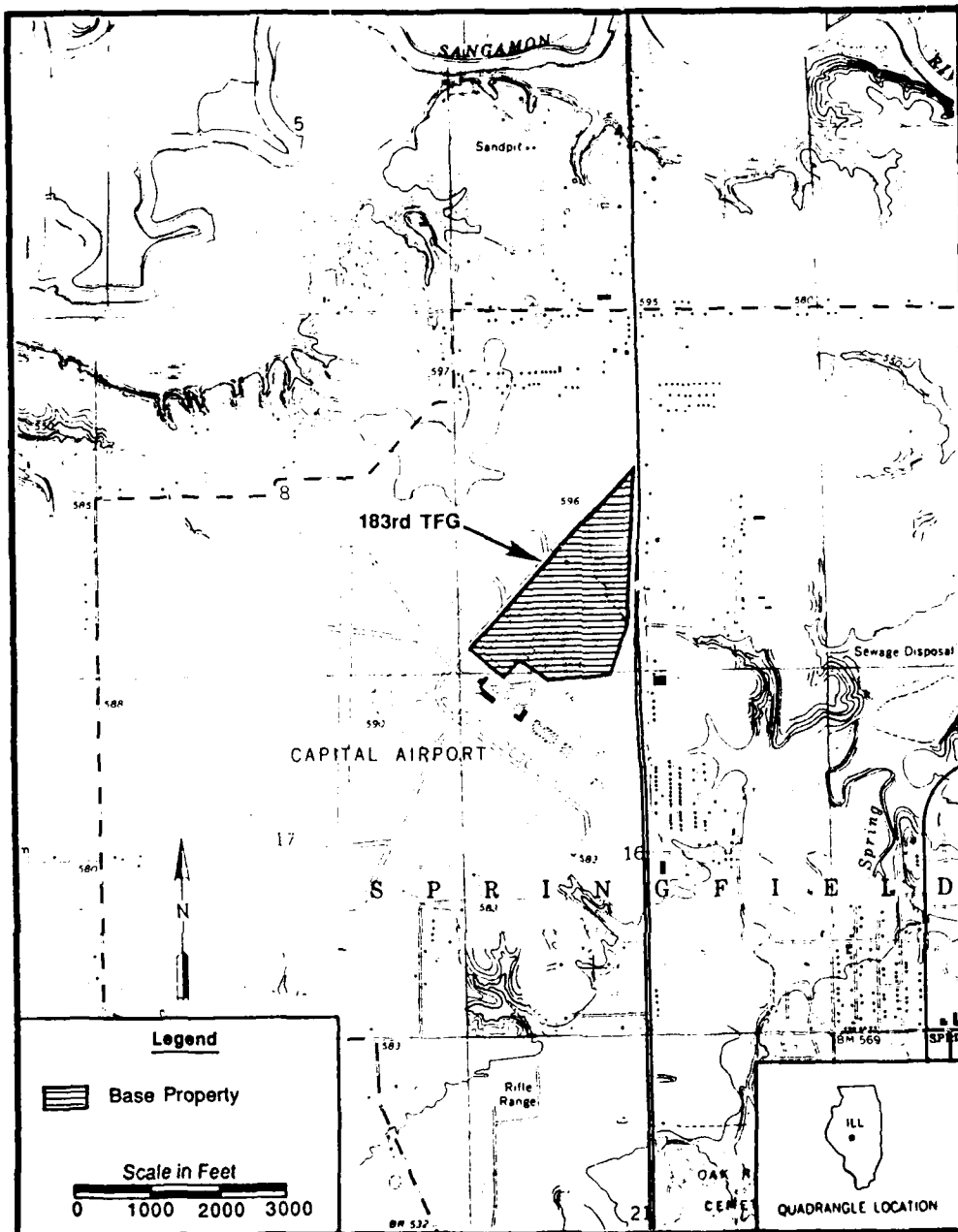
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INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

183rd TACTICAL FIGHTER GROUP
ILLINOIS AIR NATIONAL GUARD
CAPITAL AIRPORT
SPRINGFIELD, ILLINOIS

May 1990

Prepared for

National Guard Bureau
Andrews Air Force Base, Maryland 20331-6008

Originally Prepared by

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11140 Rockville Pike
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ACRONYM LIST

AFB	-	Air Force Base
AGE	-	Aerospace Ground Equipment
ANG	-	Air National Guard
CFS	-	Cubic Feet per Second
DEQPPM	-	Defense Environmental Quality Program Policy Memorandum
DOT	-	Department of Transportation
FR	-	Federal Register
FTA	-	Fire Training Area
HARM	-	Hazard Assessment Rating Methodology
HAS	-	Hazard Assessment Score
HAZWRAP	-	Hazardous Waste Remedial Actions Program
HM/HW	-	Hazardous Materials/Hazardous Wastes
HMTC	-	Hazardous Materials Technical Center
IRP	-	Installation Restoration Program
N.D.	-	No Date
NGB	-	National Guard Bureau
NOAA	-	National Oceanic and Atmospheric Administration
OSHA	-	Occupational Safety and Health Administration
OWS	-	Oil Water Separator
PA	-	Preliminary Assessment
PE	-	Professional Engineer
PG	-	Professional Geologist
POC	-	Point of Contact
POL	-	Petroleum, Oil, and Lubricant
RD&D	-	Research, Development, and Demonstration
RD/RA	-	Remedial Design/Remedial Action
SAC	-	Strategic Air Command
SARA	-	Superfund Amendments and Reauthorization Act
SI/RI/FS	-	Site Investigation/Remedial Investigation/Feasibility Study
TFG	-	Tactical Fighter Group
USAF	-	United States Air Force
USDA	-	United States Department of Agriculture
UST	-	Underground Storage Tank

FOREWORD

This Preliminary Assessment (PA) document was originally prepared for the National Guard Bureau (NGB) by the Hazardous Materials Technical Center (HMTc), operated by the Dynamac Corporation. HMTc's contract for conducting PAs ended prior to completion of the final PA document. Subsequently, the NGB requested completion of this PA under an existing contract with the Hazardous Waste Remedial Actions Program (HAZWRAP) Support Contractor Office, operated by Martin Marietta Energy Systems, Inc. for the U.S. Department of Energy. In turn, HAZWRAP subcontracted with Science and Technology, Inc. for completion of the PA document. Science and Technology, Inc. successfully completed this document in May 1990.

Science and Technology, Inc. produced the final document primarily by addressing comments generated by the NGB through review of HMTc draft documents. Since HMTc conducted the PA and prepared the original PA manuscript, the content of this document is principally a reflection of HMTc's efforts.

EXECUTIVE SUMMARY

A. Introduction

The Hazardous Materials Technical Center (HMTc) was retained in September 1987 to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 183rd Tactical Fighter Group (TFG), Illinois Air National Guard, Capital Airport, Springfield, Illinois, (hereinafter referred to as the Base), under Contract No. DLA 900-82-C-4426. The Preliminary Assessment included:

- o an on-site visit, including interviews with 15 past and present Base employees, conducted by HMTc personnel during June 27 to July 1, 1988;
- o the acquisition and analysis of pertinent information and records on hazardous material use and hazardous waste generation and disposal at the Base;
- o the acquisition and analysis of available geologic, hydrologic, meteorologic, and environmental data from pertinent Federal, State, and local agencies, and
- o the identification and assessment of sites on the Base which may have been contaminated with hazardous materials/hazardous wastes (HM/HW).

B. Major Findings

Past Base operations involved the use and disposal of materials and wastes that were subsequently categorized as hazardous. The major operations of the Base that use and dispose of HM/HW include the Motor Pool; Aerospace Ground Equipment (AGE) Maintenance; Petroleum, Oils, and Lubricants (POL) Management; Corrosion Control; Aircraft Maintenance; and the Flightline. Waste oils, cleaning solvents, hydraulic fluid, paint wastes, thinners, and JP-4 waste fuel are generated by these activities.

Interviews with 15 past and present Base personnel with an average of 23 years tenure and a field survey resulted in the identification of two disposal and/or spill sites at the Base that are potentially contaminated

with HM/HW. These sites were assigned a Hazard Assessment Score (HAS) according to the U.S. Air Force Hazard Assessment Rating Methodology (HARM).

Site No. 1 - POL Storage Area

The POL storage area is located on the northeast side of the Base. A major spill occurred at the POL facility sometime between 1958 and 1959 when an underground fuel pump leaked approximately 3100 gallons of JP-4 onto the ground. The Base Fire Department was called to clean up the spill, but very little fuel was recovered. The fuel was covered with foam, diluted with water, and washed down a storm drain discharging to the tributary east of the Base. Some fuel soaked into the ground surrounding the POL facility.

Minor fuel spills (10 to 50 gallons) were reported before 1981 in the POL area. Three spills were from truck overfills and from operations during the unloading of delivery trucks. These spills were washed down to the grass or rocky area away from the drains.

During daily fueling operations, frequent spills of small quantities of JP-4 have occurred. Each of these spills in the POL area involved only 1-2 gallons of JP-4.

Site No. 2 - Old Fire Training Area

The Old Fire Training Area (FTA) is located east of the approach end of Runway 36 and approximately 120 feet north of a small pond and creek located on the south side of the airport on airport property. The Base conducted operations at the Old FTA from 1949 to 1974.

In 1974 the Base stopped using the Old FTA and moved operations to the newer FTA. The newer FTA is located west-northwest of the approach end of Runway 18 on airport property. This FTA has not been used since 1985.

The Base conducted fire training operations at the Old FTA approximately twice a month. During a

typical fire training exercise, the Base burned 200 to 300 gallons of flammable liquids that may have included any of the following: JP-2 and JP-3 fuel, paints, paint strippers, solvents, and other flammables from the various shops. A minimum amount of water may have been sprayed onto the FTA before the flammables were poured on the site and ignited.

Assuming that approximately 70% of the fuel was burned during operations and 30% remained, 36,000 to 54,000 gallons of fuel may have been available to either volatilize or soak into the ground during use of the Old FTA. During the site visit, there was no visible evidence of contamination.

C. Conclusions

Information obtained through interviews with past and present Base personnel resulted in the identification of two areas on the Base that are potentially contaminated with HM/HW. At the identified sites, the potential exists for contamination of soils, of surface water, of groundwater, and subsequent contaminant migration. These sites were therefore assigned a HAS according to HARM.

D. Recommendations

Further IRP investigation is recommended for Site No. 1 - POL Storage Area and Site No. 2 - Old Fire Training Area.

I. INTRODUCTION

A. Background

The Illinois Air National Guard (ANG) at the Capital Airport, Springfield, Illinois (hereinafter referred to as the Base) supports the 183rd Tactical Fighter Group (TFG). This unit was established in 1948 as the 170th Fighter Squadron. Past operations at the Base involved the use and disposal of materials and wastes that subsequently were categorized as hazardous. Consequently, the National Guard Bureau has implemented its Installation Restoration Program (IRP). The IRP consists of the following:

- o Preliminary Assessment (PA) - to identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment.
- o Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - to acquire data via field studies for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment and to select a remedial action through preparation of a feasibility study.
- o Research, Development, and Demonstration (RD & D) - if needed, to develop new technology for accomplishment of remediation.
- o Remedial Design/Remedial Action (RD/RA) - to prepare designs and specifications and to implement site remedial action.

B. Purpose

The purpose of this Preliminary Assessment is to identify and evaluate suspected problems associated with past hazardous waste handling procedures, disposal sites, and spill sites on the Base. Personnel from the Hazardous Materials Technical Center (HMTTC) visited the Base, reviewed existing environmental information, analyzed Base records concerning the use and generation of hazardous materials/hazardous wastes (HM/HW), and

conducted interviews with past and present Base personnel who are familiar with past hazardous materials management activities. A physical inspection was made of the suspected sites. Relevant information collected and analyzed as a part of the Preliminary Assessment included the history of the Base; local geologic, hydrologic, and meteorologic conditions that may affect migration of contaminants; local land use; public utilities; zoning requirements that could affect the potential for exposure to contaminants; and the ecologic settings that indicate environmentally sensitive habitats or evidence of environmental stress.

C. Scope

The scope of this Preliminary Assessment is limited to the Base and includes:

- o an on-site visit;
- o the acquisition of pertinent information and records on hazardous materials use and hazardous wastes generation and disposal practices at the Base;
- o the acquisition of available geologic, hydrologic, meteorologic, land use and zoning, critical habitat, and utility data from various Federal, State, and local agencies;
- o a review and analysis of all information obtained; and
- o the preparation of a report to include recommendations for further actions.

The on-site visit and interviews with past and present Base personnel were conducted during the period June 27 to July 1, 1988. The Preliminary Assessment site visit was conducted by Ms. Grace E. Hill, Task Manager/Environmental Scientist; Ms. Kathryn Gladden, Chemical Engineer; and Mr. Bruce Beach, Hydrogeologist. Other HMTc personnel who assisted with the Preliminary Assessment include Mr. Raymond G. Clark, PE/Department Manager and Mark Johnson, PG/Program Manager (Appendix A). Personnel from the National Guard Bureau (NGB) who assisted in the Preliminary Assessment include Mr. Basit Ghorri, Project Officer and Mr. Daniel P. Waltz. The

Point of Contact (POC) at the Base was Captain Harold E. Burcham.

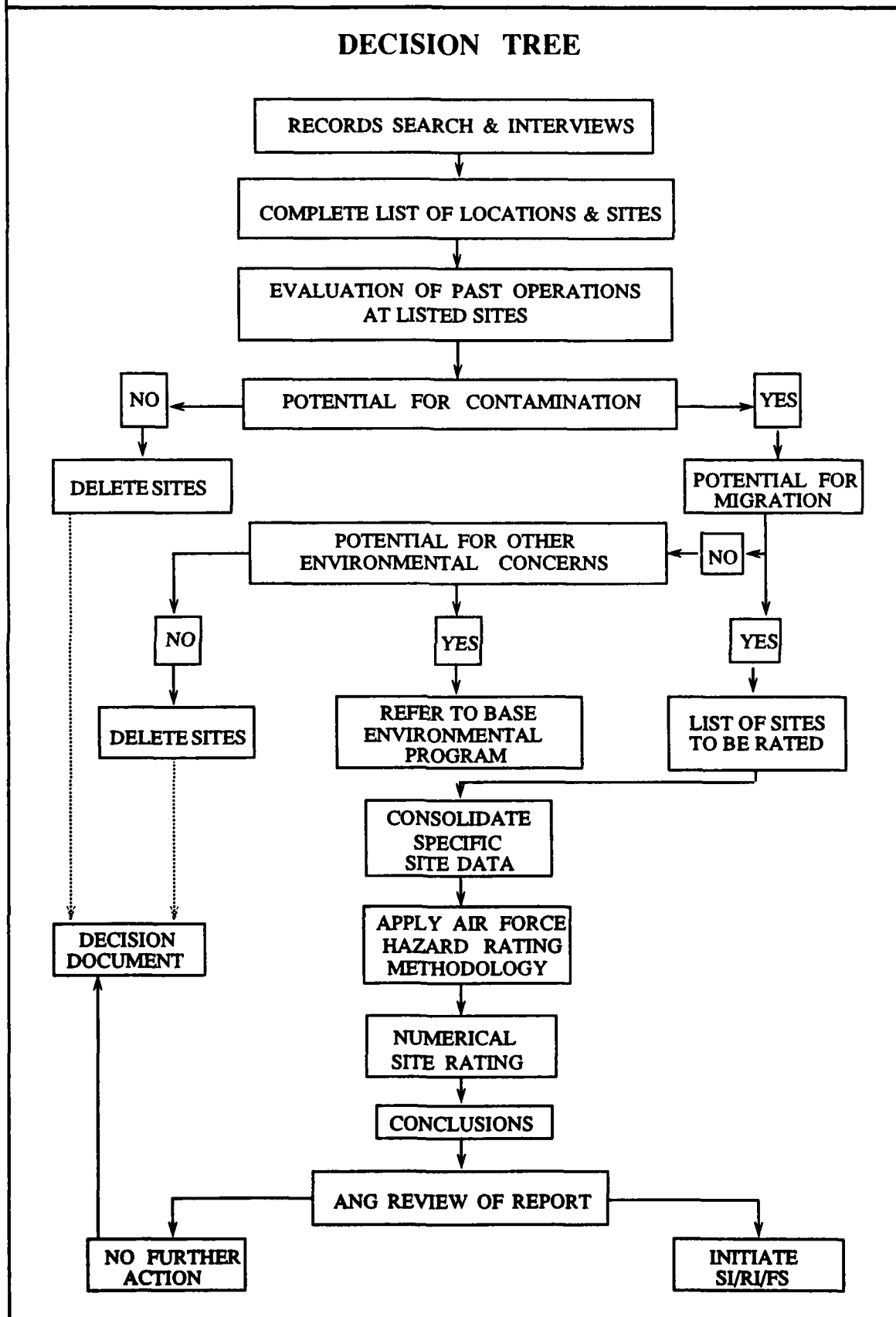
D. Methodology

A flow chart of the Preliminary Assessment methodology is presented in Figure 1. This methodology ensures a comprehensive collection and review of pertinent, site-specific information and is used in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

The Preliminary Assessment begins with a site visit to the Base to identify all shop operations or activities on the installation that may use hazardous materials or generate hazardous wastes. Next, an evaluation of both past and present HM/HW handling procedures is made to determine whether any environmental contamination has occurred. The evaluation of past HM/HW handling practices is facilitated by extensive interviews with past and present employees familiar with the various operating procedures at the Base. These interviews are also used to identify the areas on the Base where any HM/HW, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or otherwise released into the environment.

Historic records contained in the Base files are collected and reviewed to supplement the information obtained from interviews. Using this information, a list of past waste spill/disposal sites on the Base is generated. These sites are then subject to further evaluation. A general survey tour of the identified sites, the Base, and the surrounding area is conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention is given to locating nearby drainage ditches, surface water bodies, residences, and wells.

Detailed geologic, hydrologic, meteorologic, development (land use and zoning), and environmental data for the area of study is also obtained from the POC and from appropriate Federal, State, and local agencies. A list of outside agencies contacted is in Appendix B. Following a detailed analysis of all the information obtained, areas are identified as suspect areas where HM/HW disposal and/or spills may have occurred. Where



sufficient information is available, sites are assigned a Hazard Assessment Score (HAS) using the U.S. Air Force Hazard Assessment Rating Methodology (HARM) (Appendix C). However, the absence of a HAS does not necessarily negate a recommendation for further IRP investigation, but rather, may indicate a lack of data. The HAS is computed from the data included in the Factor Rating Criteria (Appendix D).

II. INSTALLATION DESCRIPTION

A. Location

The Base is located on the northeast portion of Capital Airport, which is located northwest of Springfield, Illinois. The airport is bordered by the Sangamon River to the north. The land around the Base is residential and commercial with agricultural land to the south and northwest of the airport. Topographically, the Base and airport are situated on a plateau with a slight rise in elevation to the northwest. To the east and south, the elevation drops very slowly. To the west, the elevation slightly rises then slowly drops. The area has no more than 15 feet of relief. Figure 2 shows the location and boundary of the Base covered in this Preliminary Assessment.

B. Organization and History

The Illinois Air National Guard was established in September 1948 and was named the 170th Fighter Squadron. It was equipped with F-51 aircraft. The 170th Weather Station and the 170th Utility Flight were also formed to provide Base services. In 1951 the Weather Station and the Fighter Squadron were ordered to active duty. Both of these units were moved to Bergstrom Air Force Base, Texas on March 15, 1951. The Fighter Squadron remained at Bergstrom and was assigned to the Strategic Air Command (SAC) (Looby, 1983).

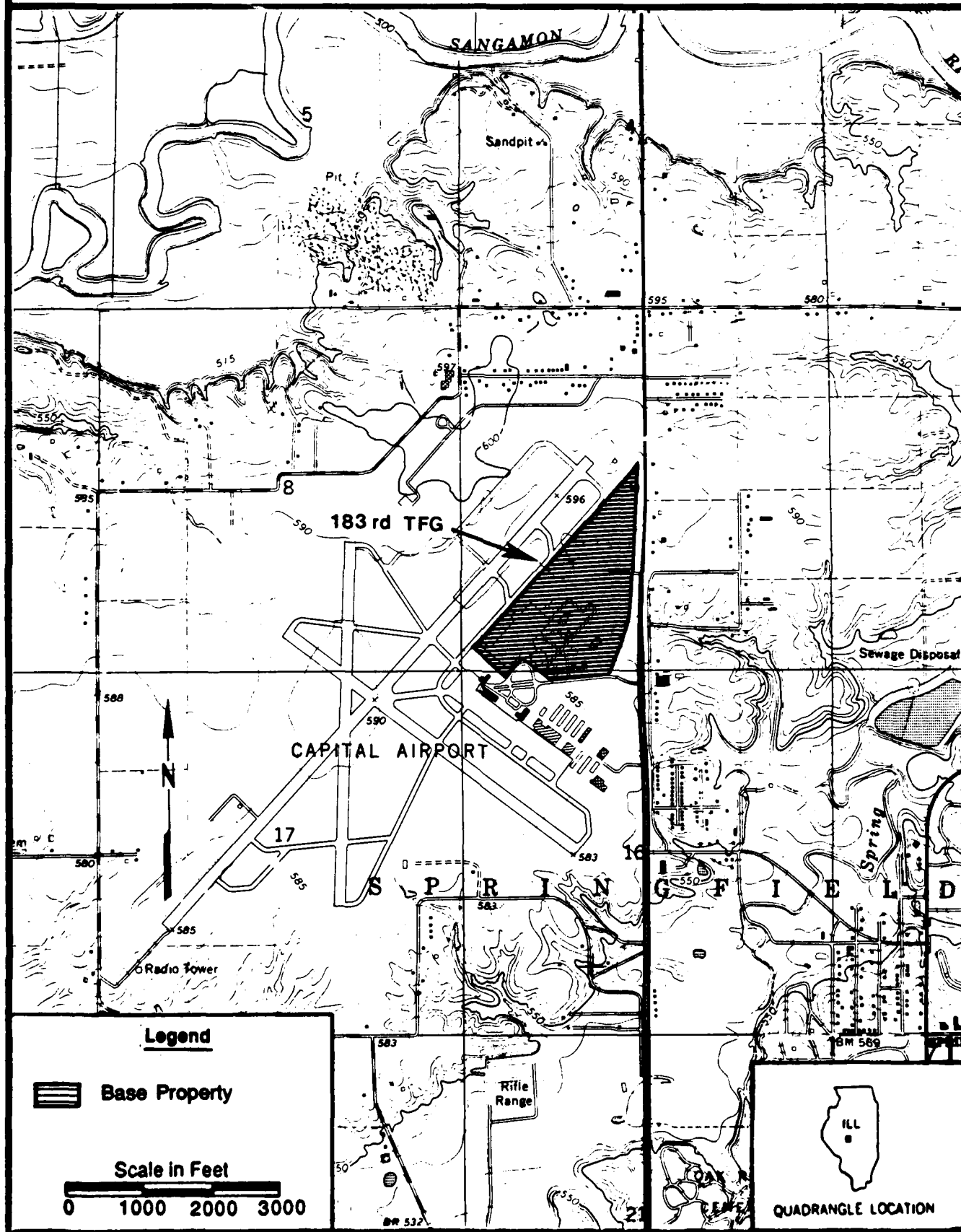
Effective April 9, 1951, the 170th Fighter Squadron was redesignated as the 170th Fighter Bomber Squadron. During August 1952, personnel began to be individually released from active duty with the Air Force. Once replacements came, men of the 170th began returning to Springfield and home. By November 1952, the squadron was released from active duty and reverted back to the State of Illinois once again residing in Springfield. In November 1953, the unit received the first T-33 jet trainer and F-86 Sabre Jet; the F-51 Mustang aircraft were phased out of the unit. The first F-84F "Thunderstreak" jet arrived on February 2, 1955, and the F-86 aircraft were phased out (Looby, 1983).

HMTC

Source: USGS, 1965.

Figure 2

Location Map of the 183rd TFG,
Illinois Air National Guard, Capital
Airport, Springfield, Illinois



In 1962 the 170th was reorganized from the single squadron concept to that of a tactical fighter group, its present designation. The 170th Tactical Fighter Squadron was the nucleus. Four newly organized support units completed the group's organization: the 183rd Tactical Fighter Group, the 183rd Dispensary, the 183rd Materiel Squadron, and the 183rd Combat Support Squadron (Looby, 1983).

Early in 1971, the Air Force announced that it was assigning some of its F-4 "Phantom" fleet to the ANG. The 183rd was the first Guard unit to receive the F-4 aircraft when an F-4 Phantom was flown in on January 31, 1972. On January 19, 1975, the 183rd Tactical Fighter Group received the F-4C aircraft and finally the F-4D aircraft on January 1, 1981 (Looby, 1983).

The Illinois Air National Guard (ANG) is currently supported by the 183rd Tactical Fighter Group.

III. ENVIRONMENTAL SETTING

A. Meteorology

The meteorological data presented in this section is from local data compiled by the National Oceanic and Atmospheric Administration (NOAA) for the Springfield, Illinois area. The climate of the Springfield, Illinois area is continental. Summers are hot, and winters are cold. The average annual temperature is 53 degrees Fahrenheit with summer temperatures averaging in the high 70s and winter temperatures averaging in the mid 20s.

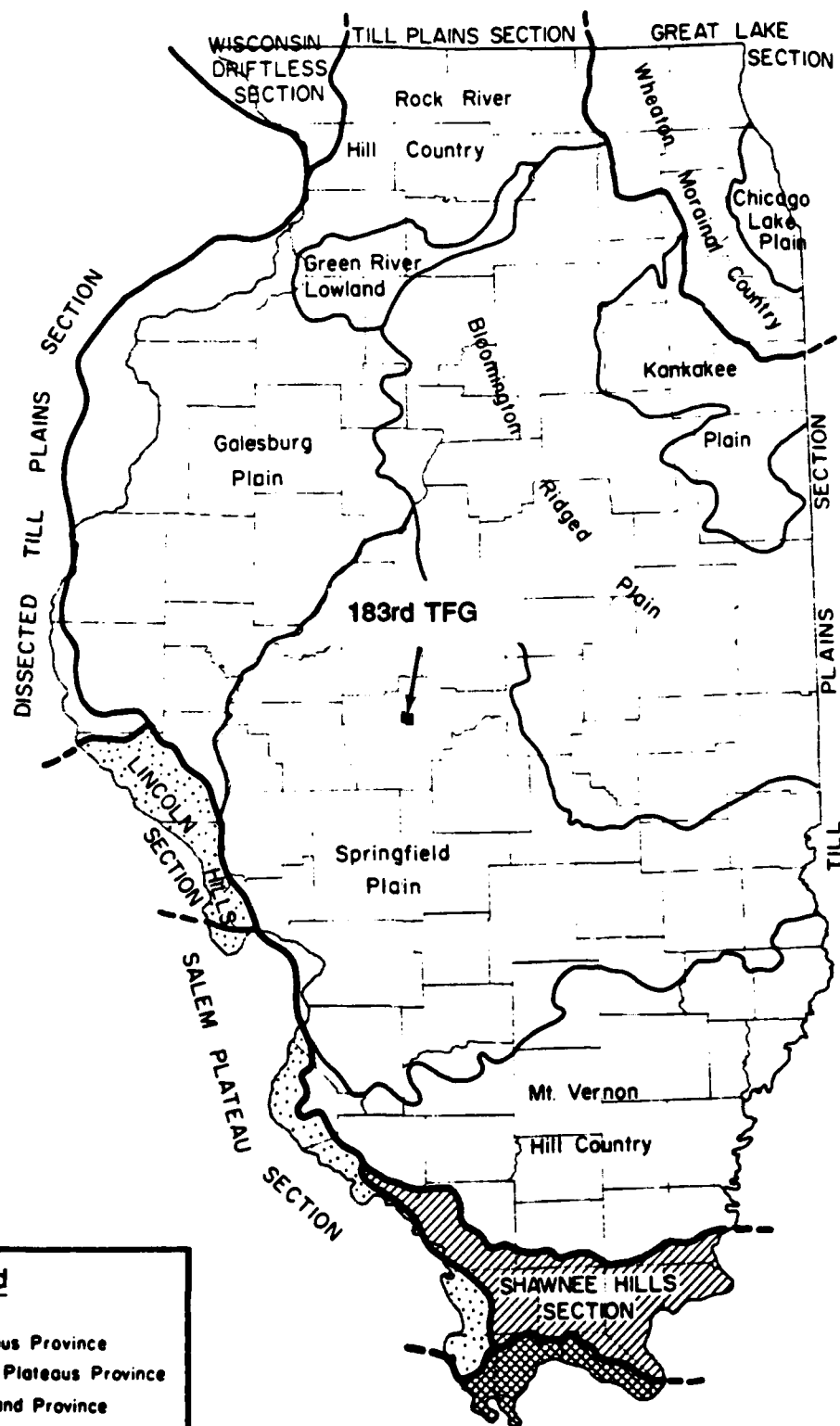
According to the National Weather Service, located at Capital Airport, the average annual precipitation is 33.78 inches. By calculating the net precipitation according to the method outlined in the Federal Register (47 FR 31224), a net precipitation value of 1 inch per year is obtained. Maximum rainfall intensity, based on a 1-year, 24-hour rainfall, is 2.7 inches (47 FR 31235).

B. Geology

Regional Geology/Geography

The Base is located in west-central Illinois within the Till Plains Section of the Central Lowland Physiographic Province (Figure 3). Specifically, the Base is located in the Springfield Plain region, a relatively subdued topographic upland area underlain by Illinoian and older aged loess and unconsolidated glacial drift sediments. The thickness of these sediments ranges from 0 to 300 feet. The thicker sections of unconsolidated sediments concentrate in bedrock valleys (buried valleys) that were scoured by advancing glaciers. The location of these valleys in west-central Illinois is illustrated in Figure 4.

The bedrock stratigraphy that overlies the crystalline rock basement within west-central Illinois and in the vicinity of the Base consists of a 6000 to 7000 foot sequence of sedimentary rocks. As illustrated in Figure 5, these sedimentary rocks belong to the Cambrian, Ordovician, Silurian, Devonian, Mississippian, and Pennsylvanian systems. Also, the sediments that comprise these rocks were deposited within the Illinois Basin, a structural geosynclinal basin that encompasses



Legend

- Ozark Plateaus Province
- Interior Low Plateaus Province
- Central Lowland Province
- Coastal Plain Province

0 20 40
Scale in miles

Source: Selkregg and Kempton, 1958.

Location of the Bedrock Valleys
(Buried Valleys) in West-Central Illinois

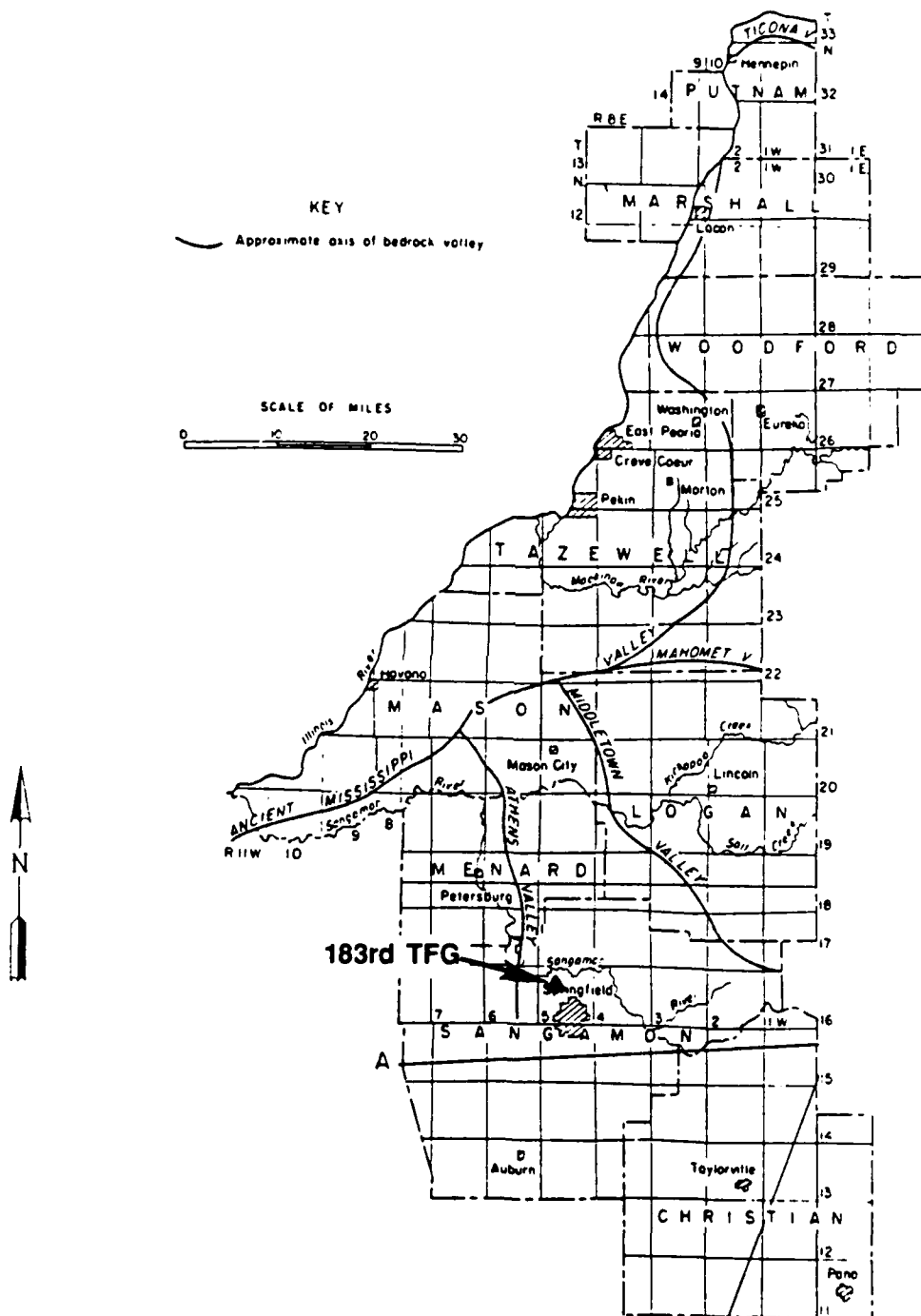
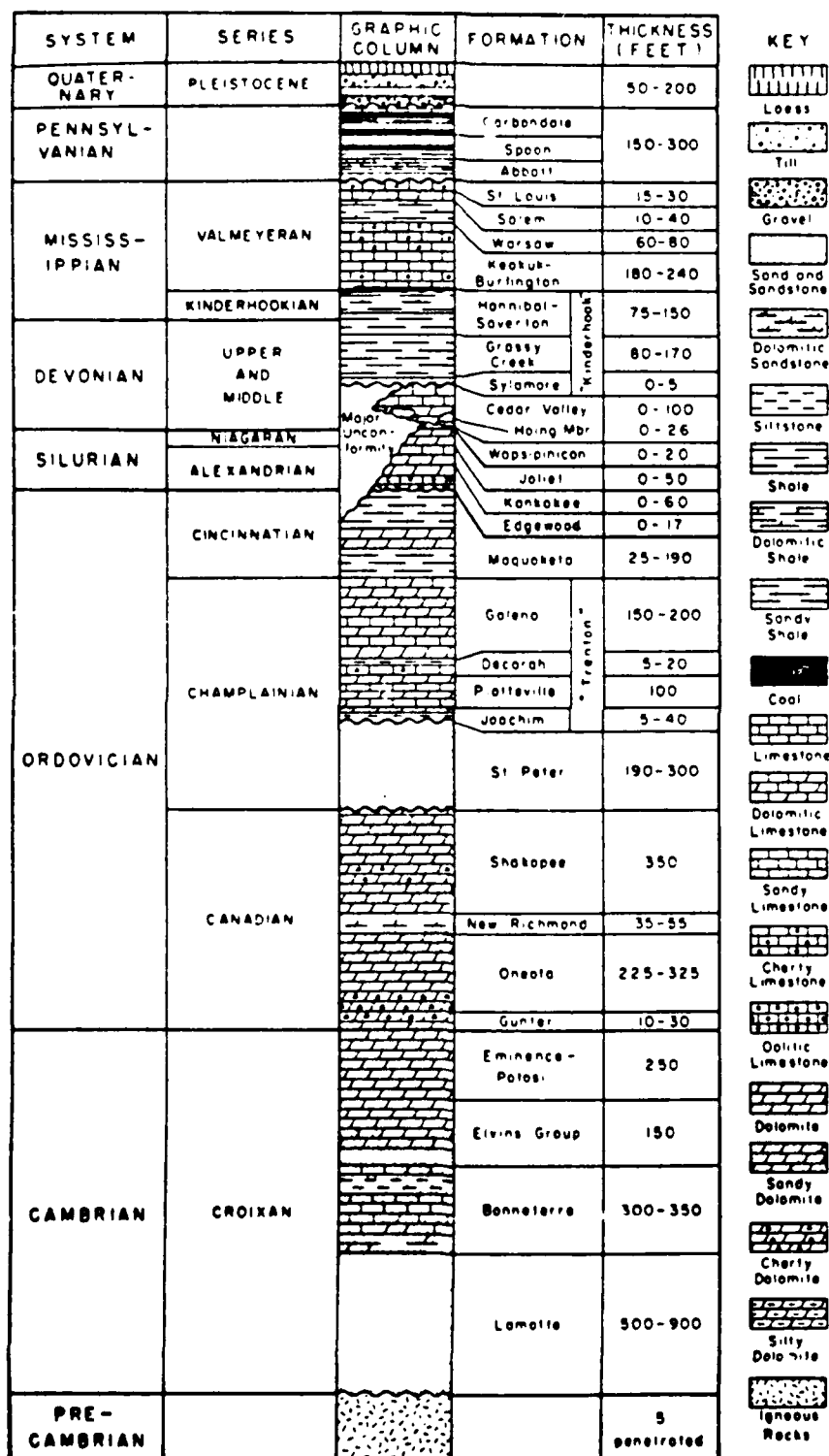


Figure 5
Generalized Stratigraphic
Section of Illinois



portions of Illinois, Indiana, and Kentucky. The stratigraphic sequence illustrated in Figure 5 dips regionally to the southeast and thickens (increase in formation thickness and addition of new formations) to a maximum of 14,000 feet near the center of the Basin.

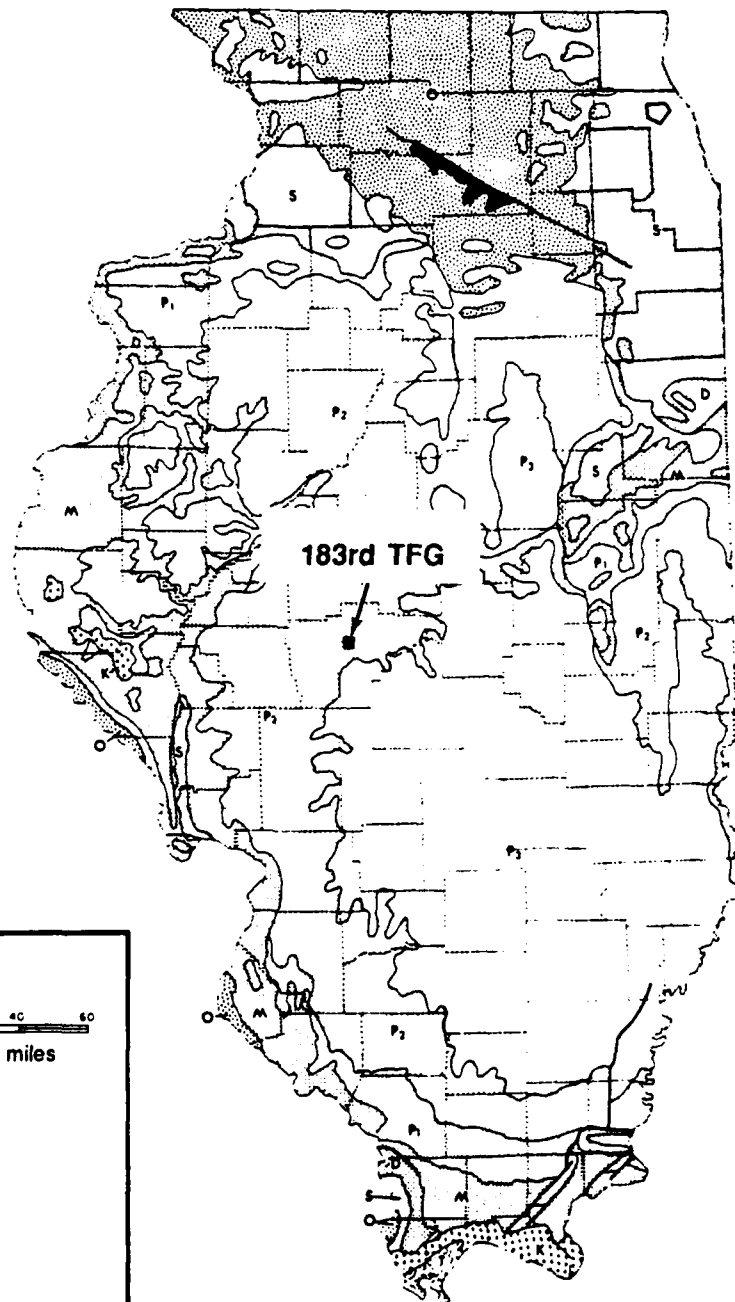
In addition to the stratigraphic horizons for major unconformities, the lithology for Cambrian, Ordovician, Silurian, Devonian, and Mississippian formations is illustrated in Figure 5. Cambrian and Ordovician aged formations are predominately dolomites and sandstones. Some shale sections occur within the Cambrian aged Bonneterre and the Ordovician aged Maquoketa Formations. Silurian and Devonian aged formations consist predominantly of limestones, dolomite, and shale. Oil and gas have been produced from Devonian and Silurian aged limestones in the Springfield area.

The upper and lower boundaries of both the Silurian and Devonian systems are marked by unconformities. The Mississippian aged limestone and sandstone formations contain major oil and gas reservoirs throughout the Illinois Basin. The contact between the Mississippian and overlying Pennsylvanian systems is marked by a distinct, widespread angular unconformity. As a result, Pennsylvanian aged rocks overlie progressively older Mississippian aged rocks toward the edge of the Illinois Basin. The Pennsylvanian rocks consist of cyclic interbedded sequences of shales, sandstones, coal, and a few minor limestone units. Pennsylvanian aged rocks have been mined extensively for coal throughout Sangamon County, Illinois.

Local Geology

As previously mentioned, the bedrock stratigraphy that overlies the crystalline rock basement at the Base consists of a 6000- to 7000-foot sequence of Cambrian, Ordovician, Silurian, Devonian, Mississippian, and Pennsylvanian aged sedimentary rocks. The Pennsylvanian aged Carbondale and Modesto Formations underlie the surficial unconsolidated sediments at the Base and throughout much of west-central Illinois (Figure 6).

The Carbondale Formation consists predominately of gray shale but also contains sandstones and argillaceous limestones. Sandstone units occur as bedded, sheetlike units and elongate channel facies. These sandstone



Legend

- | | |
|--|---|
| | TERTIARY |
| | CRETACEOUS |
| | PENNSYLVANIAN
Bond and Merriam Formations
Includes narrow belts of
older formations along
LaSalle Anticline |
| | PENNSYLVANIAN
Carbondale and Modesto Formations |
| | PENNSYLVANIAN
Caseyville, Abbott, and Spoon
Formations |
| | MISSISSIPPIAN
Includes Devonian in
Hardin County |
| | DEVONIAN
Includes Silurian in Douglas,
Champaign, and western
Rock Island Counties |
| | SILURIAN
Includes Ordovician and Devonian in Calhoun,
Greene, and Jersey Counties |
| | ORDOVICIAN |
| | CAMBRIAN |
| | Des Plaines Complex - Ordovician to Pennsylvanian
Fault |

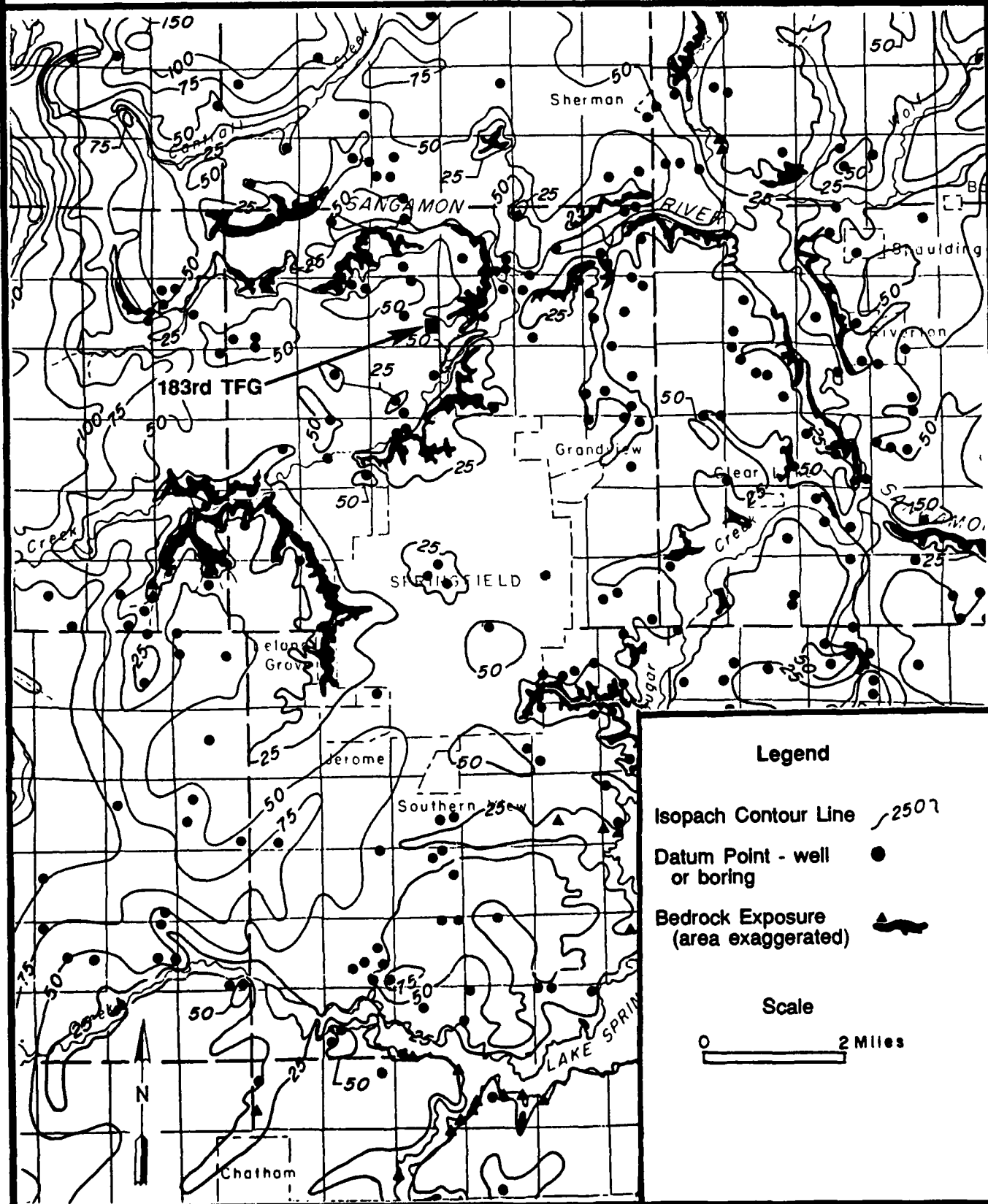
channels attain a maximum thickness of 100 feet. Argillaceous limestones are widespread and contain extensive black, fossiliferous marine shales. The Carbondale Formation contains the principal economic coals of Illinois.

The Modesto Formation is lithologically similar to the underlying Carbondale Formation. It is distinguished from the Carbondale by thinner coal beds, thicker and less argillaceous limestones, and numerous reddish shales associated with open-marine limestones. The Modesto Formation predominately contains thick, gray shales. Sandstones that sporadically occur as channel deposits reach a maximum thickness of 80 feet. The coal seams are thin and widespread.

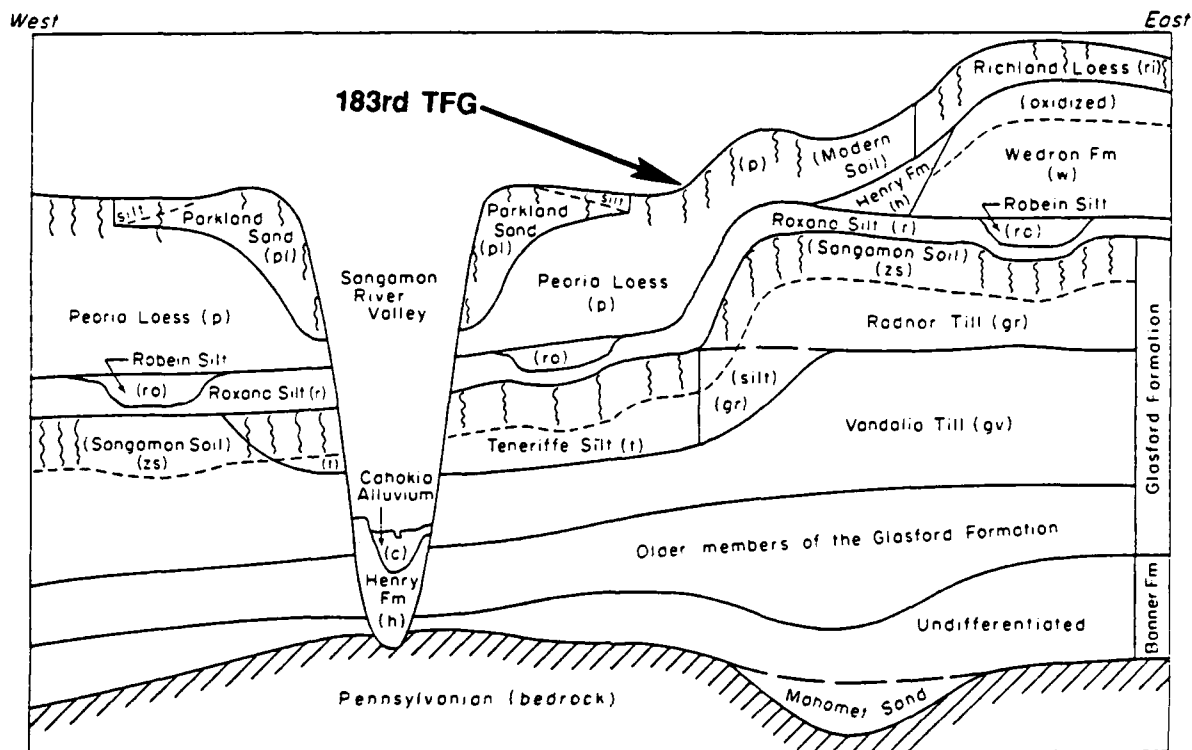
Various types of unconsolidated sediments overlie the Pennsylvanian bedrock (Modesto and Carbondale Formations) throughout the Springfield area and west-central Illinois. As previously mentioned, these sediments range from 0 to 300 feet in thickness. As illustrated in Figure 7, the thickness of unconsolidated sediments at the Base and in its immediate vicinity is approximately 50 feet.

There are two types of unconsolidated deposits in the Springfield area: (1) valley deposits, sediments that underlie the valleys of the Sangamon River and its tributaries and (2) upland deposits, sediments that underlie the areas above the river's flood plain and terraces. The Base is located in the upland area approximately two miles east of the Sangamon River. A cross section of both types of unconsolidated sediments is illustrated in Figure 8. The Sangamon River Valley is underlain by the Cahokia Alluvium and the Henry Formation. The Cahokia Alluvium consists of silt, clayey silt, and sandy silt. The Cahokia Alluvium was deposited in the flood plains by recent flowing water, floodwaters, and organisms. The underlying Henry Formation, which occurs mainly along the Sangamon River Valley, consists of well-sorted to poorly sorted, medium- to coarse-grained sand with lenses of gravelly sand. Its thickness ranges from 10 to 60 feet. The Equality Formation underlies the Cahokia Alluvium along the tributary valleys of the Sangamon River. The Equality Formation is primarily composed of silt.

Unconsolidated sediments that underlie the upland areas predominantly consist of surficial loess underlain



Source: Bergstrom et al, 1976.

Figure 8
Cross Section of the Unconsolidated
Sediments at the Base and Vicinity

Not to Scale

by glacial till. However, the Parkland Sand is the surficial sediment along the edge of the Sangamon River Valley. These sediments are shown in Figure 8. The Parkland Sand consists of fine- to medium-grained, windblown dune deposits. It is a wedge-shaped deposit that thins and pinches out toward the uplands. Its thickness ranges from 0 to 50 feet.

The unconsolidated formations at the Base, in descending stratigraphic sequence, are the Peoria Loess, Roxana Silt, Sangamon Soil, and the Glasford Formation (see Figure 8). The Peoria Loess is a glacially derived, windblown deposit consisting of silt with minor amounts of clay, sand, and gravel. The Peoria commonly contains 60 - 85% silt, 3 - 10% sand, 10 - 40% clay, and 0 - 1% gravel. Its thickness ranges from 6 to 15 feet. The underlying Roxana Silt is also a windblown loess deposit. Lithologically, the Roxana Silt is a sandy silt that contains 5 - 20% sand, 50 - 80% silt, 30% clay, and 0 - 1% gravel. Its thickness ranges from 2 to 4 feet. The underlying Sangamon soil is a weathered zone that overlies the Illinoian age glacial till deposits. The Sangamon soil is a sandy clay that contains 20 - 30% sand, 30 - 40% silt, 30 - 45% clay, and 1 - 3% gravel. Underlying the Sangamon soil is the Glasford Formation. The Glasford Formation is an Illinoian age glacial till that overlies the Pennsylvanian age bedrock at the Base and in the majority of the uplands area. It is moderately compact and dense with a moderately slow permeability (1.41×10^{-4} cm/sec to 4.45×10^{-4} cm/sec). The Glasford Formation is composed of 30 - 40% sand, 30 - 45% silt, 15 - 25% clay, and 1 - 5% gravel.

C. Soils

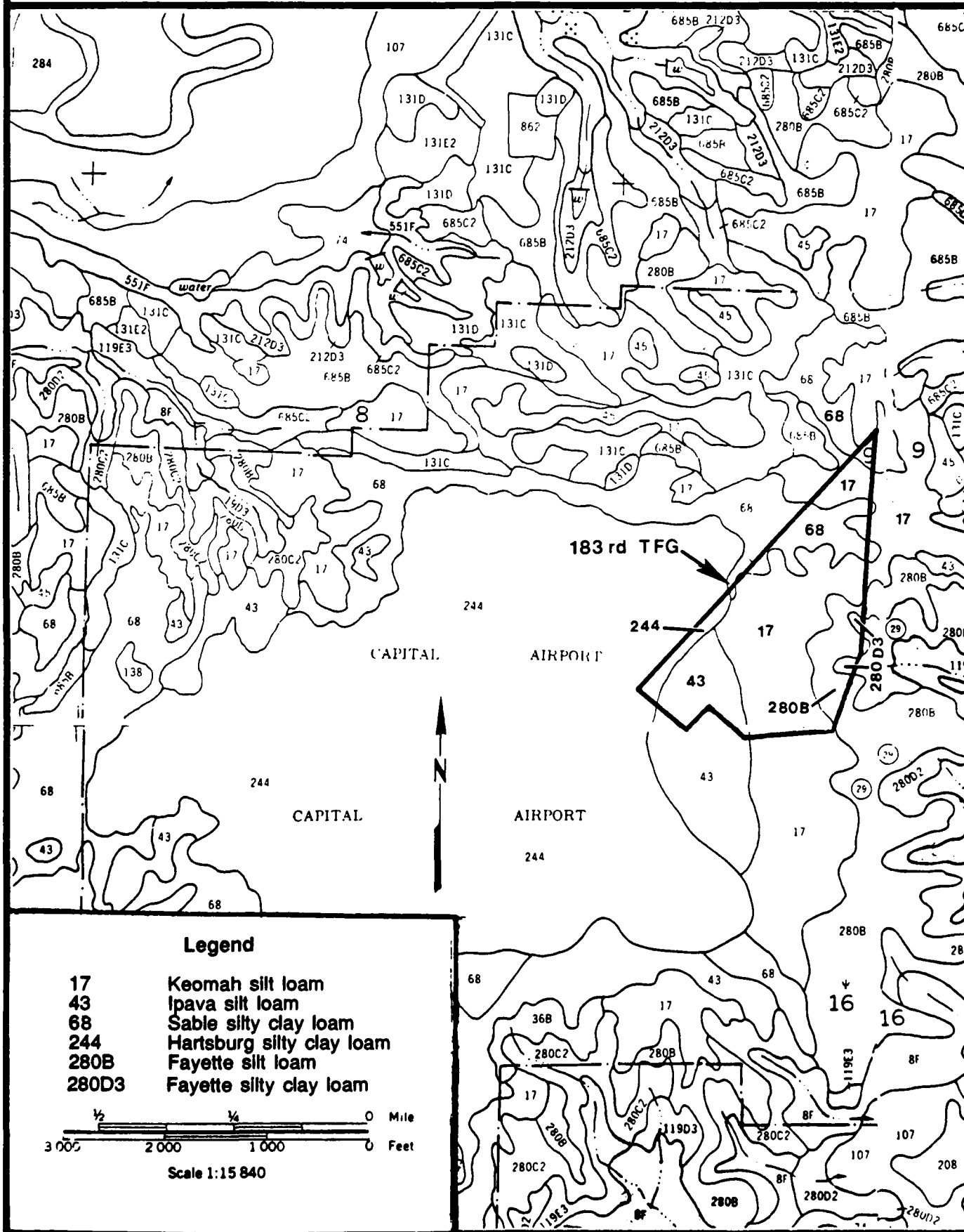
The soil types at the Base are the Hartsburg silty clay loam, Ipava silt loam, Sable silty clay loam, Keomah silt loam, and Fayette silt loam. The areal distribution of these soil types at the Base is shown in Figure 9. Permeability for each of these soils is moderate, ranging from 4.45×10^{-4} to 1.14×10^{-3} cm/sec.

The Hartsburg silty clay loam is a nearly level, poorly drained soil that occurs in slight depressions on upland flats. It is subject to occasional flooding for brief periods in the spring. The surface soil is a black silty clay loam about 13 inches thick. The subsoil is about 26 inches thick. The upper portion of the subsoil

HMTc

Source: USDA, 1976.

Figure 9
Soils Map of the 183rd TFG
and Vicinity



is very dark gray, mottled silty clay, and brown, mottled, calcareous silty clay loam. The lower part is light brownish-gray, mottled, calcareous silt loam. The underlying material to a depth of 66 inches is a gray and brown, mottled, calcareous silt loam.

The Ipava silt loam is a nearly level, poorly drained soil that occurs on upland flats. The surficial soil is a 16 inch layer of black silt loam. The subsoil is a 30 inch layer of silty clay loam. The material underlying the subsoil to a depth of 63 inches is yellowish-brown and light gray calcareous silt loam.

The Sable loam soils are nearly level, slightly depressional, and poorly drained. The surface soil is typically black silty clay loam about 19 inches thick. The subsoil is 23 inches thick. It is dark grayish-brown and grayish-brown, mottled silty clay loam and silt loam. The underlying material is light brownish-gray, mottled, calcareous silt loam.

The Keomak soils are nearly level and somewhat poorly drained. The surface soil is dark grayish-brown silt loam about 8 inches thick. The subsoil is silty clay loam about 35 inches thick, brown in the upper part and grayish-brown in the lower part. The underlying material is gray, mottled, calcareous silt loam.

The Fayette soils are gently sloping to strongly sloping and are well-drained. They occur on convex ridgetops and knolls and along drainageways. The surface layer is dark grayish-brown silt loam about 8 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 49 inches thick. It is dark yellowish-brown and yellowish-brown silty clay loam in the upper part and yellowish-brown, mottled silt loam in the lower part. The underlying material is yellowish-brown, mottled silt loam (Steinkamp, 1980).

Information composited from five soil borings that were drilled in the area located north of the AGE building indicates that the surface soil is silty clay and trace sand with fill material. These soils range in thickness from 0.5 to 5.5 feet. The subsoil consists of silty clay with a little sand. Its thickness ranges from 6 to 18 feet. Below the 18 foot mark, the material consists of clayey silt and sand with gravel. These soil boring logs are presented in Appendix E (Professional Service Industries, Inc., 1983).

D. Hydrology

Surface Water

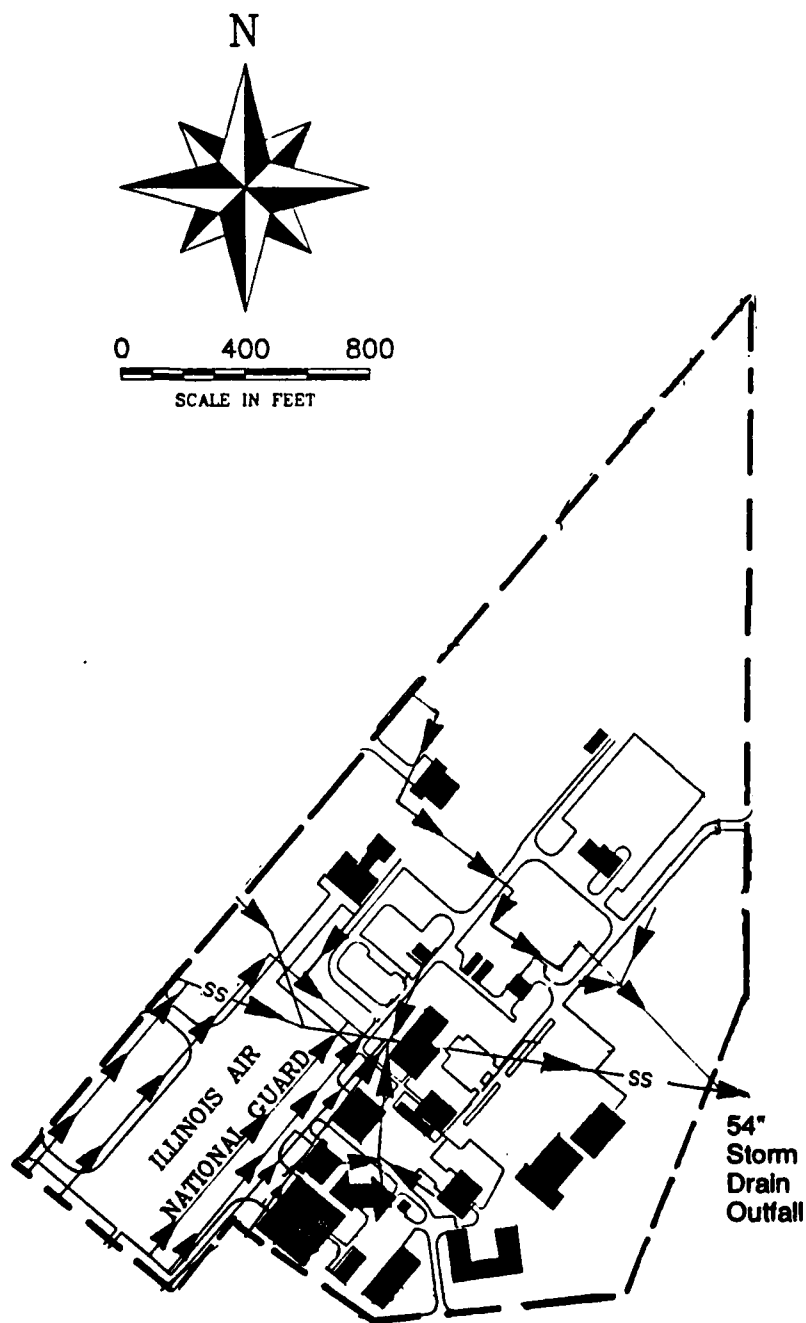
The main surface water drainage features surrounding the Base are the Sangamon River to the north and Spring Creek on the south and east sides of the Base. Sources at the Engineering Firm of Crawford, Murphy, and Tilly, a consultant for Capital Airport, indicated that the Base is not within the 100-year flood plain.

The water supply for the Base is municipal water that is purchased from the City of Springfield. The supplied water is withdrawn from Lake Springfield, which is located approximately five miles southeast of the airport.

Spring Creek, with a drainage area of 107 square miles, is a major tributary of the Sangamon River and yet, like many streams in this part of Illinois, it has a wide range of flow parameters. Over a 17-year period, the gaging station on Spring Creek has recorded a maximum discharge of 6750 cubic feet per second (cfs), but the creek has an average discharge of only 54.6 cfs. This low average results from no-flow conditions during many of the days in most of the years of record. Usually, the times of lowest flow for all surface waters in the area occur in the late summer when rainfall is low and water demand is high. As a result of these factors, water quality is poorest at this time of the year. In the Spring Creek drainage, there are several small, standing ponds close to the Base. The largest is associated with the municipal sewage treatment plant located to the east of the Base. This plant receives sewage from the Base and the Capital Airport complex. Several other small ponds are located around the airport to catch runoff. This water is stored for agricultural purposes.

The largest body of standing surface water, Lake Springfield, is located five miles southeast of the Base and has a designed storage capacity of more than 19 billion gallons. This reservoir is used for flood control, drinking water, and recreational purposes.

Surface runoff at the Base is collected in a series of storm drains, open ditches, and drainage swales (Figure 10). This runoff joins the airport's storm drain system, which crosses Base property at the Base's northwestern boundary. Surface runoff from the Base and



LEGEND

Storm Drain →
Route

Buildings ■

Base Property — — — —

Streets — — — —

the airport exits the Base at a 54-inch storm drain outfall, which is located at the Base's eastern boundary. Surface runoff from this outfall flows into an unnamed tributary of Spring Creek. The unnamed tributary joins Spring Creek approximately 3000 feet from the Base's eastern boundary (Figure 11). Spring Creek flows into the Sangamon River approximately two miles northeast of the Base.

Groundwater

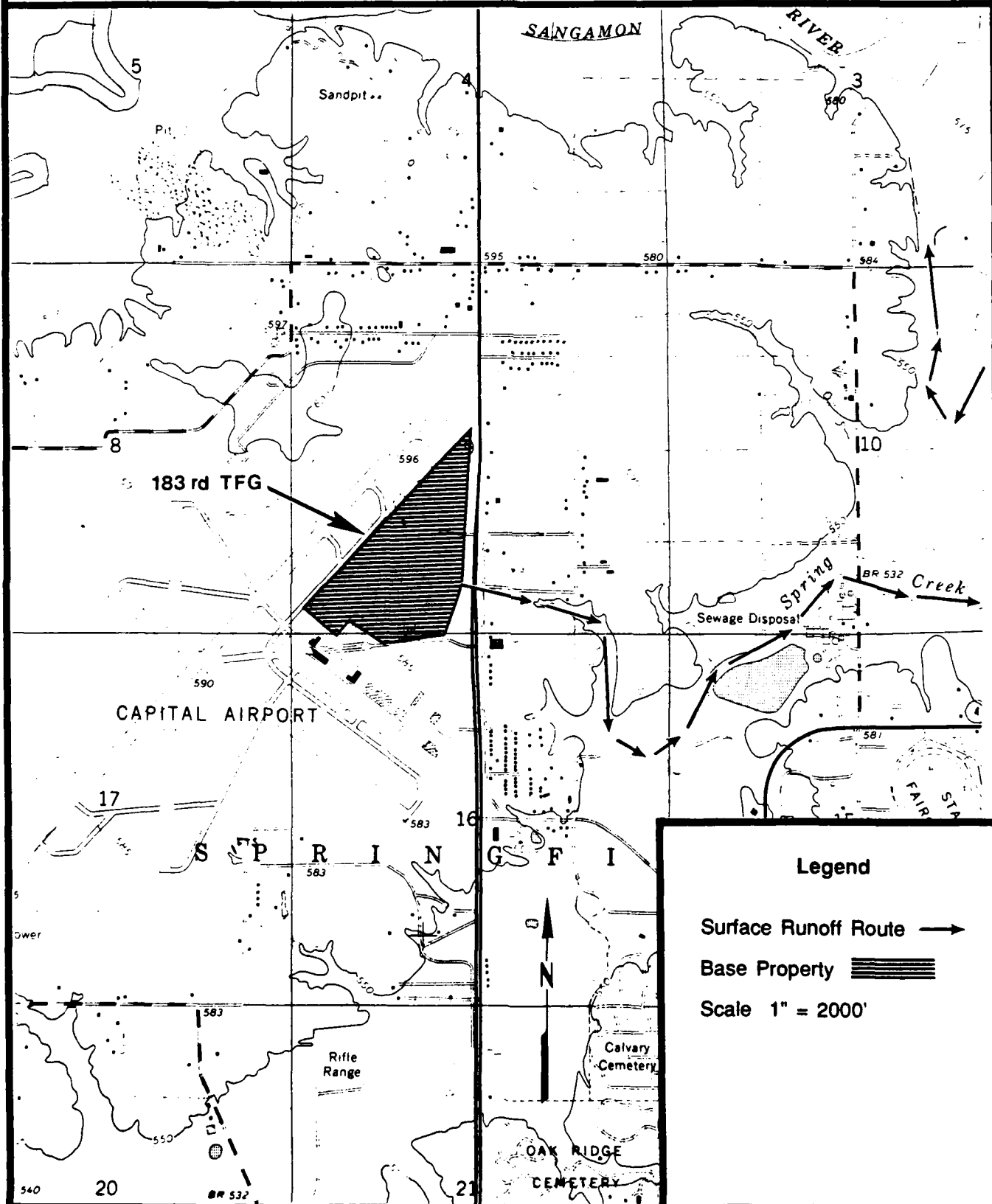
The principal aquifers at the Base, in Sangamon County, and in west-central Illinois occur within the surficial unconsolidated sediments and the underlying bedrock. The most productive aquifers concentrate within sediment-filled bedrock valleys and the Sangamon River Valley. The Bedrock aquifers concentrate within the Pennsylvanian aged Carbondale and Modesto Formations.

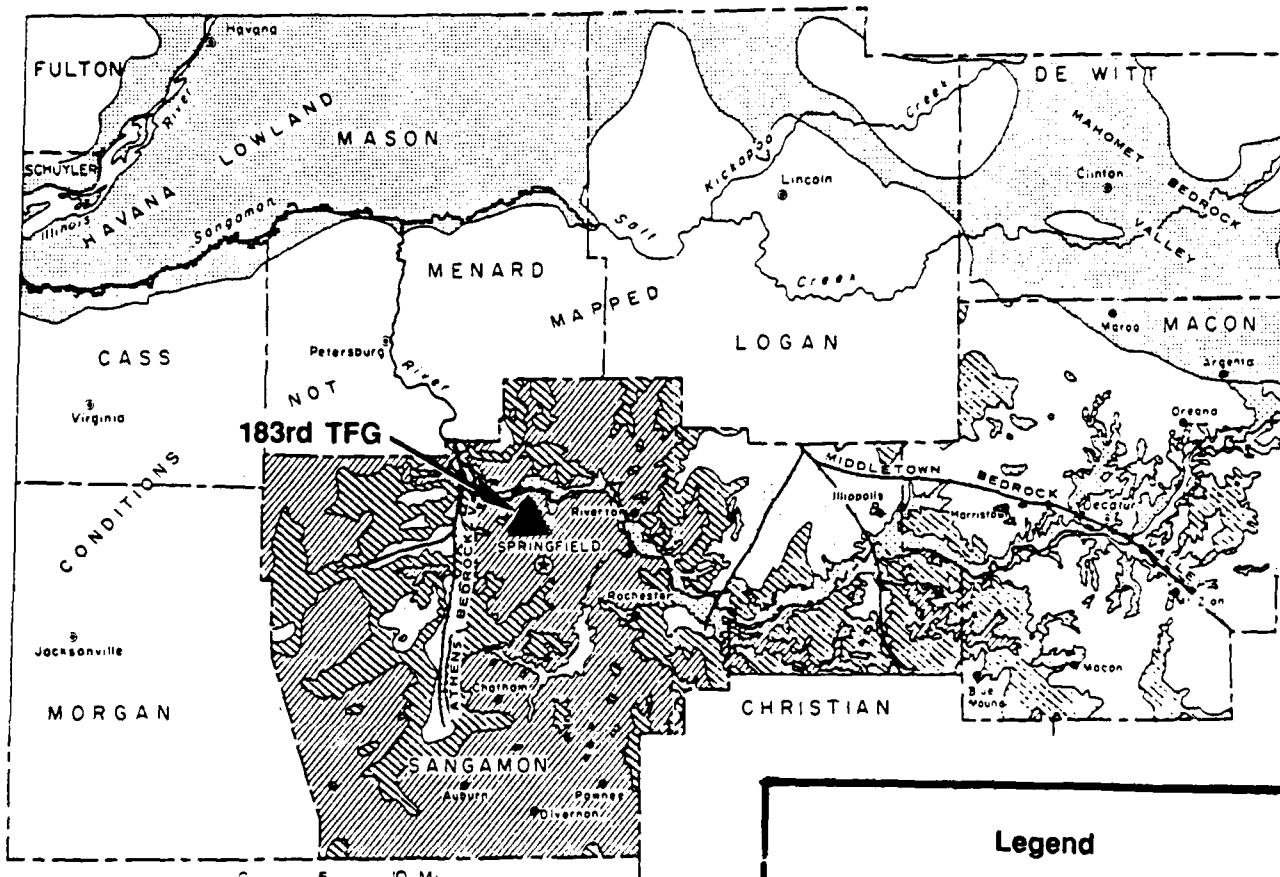
The most significant groundwater aquifers (aquifers capable of supplying municipal and commercial needs) occur within the Middleton Bedrock Valley and the Sangamon River Valley. Figure 12 shows the location of bedrock valleys, the Sangamon River Valley, and groundwater conditions throughout west-central Illinois. Glacial sediments within the Athens and Middleton Bedrock Valleys have low permeability and therefore, do not produce large groundwater yields. The Athens Bedrock Valley, which is the bedrock valley closest to the Base, is located approximately five miles west of the Base.

The Mahomet Bedrock Valley is located approximately 30 miles north-northeast of the Base. Glacial drift within this valley frequently exceeds 300 feet in thickness. Groundwater is produced from thick, highly permeable sand and gravel deposits. Two wells that were drilled to depths of 244 and 252 feet in the Mahomet Bedrock Valley have been tested at 1400 and 2500 gallons per minute (gpm), respectively (Bergstrom et al, 1976).

Aquifers within the Sangamon River Valley produce from permeable sand and gravel glacial outwash deposits within the Henry Formation. As previously stated, the Henry Formation pinches out along the edge of the Sangamon River Valley approximately one mile northwest of the Base. The permeable sand and gravel deposits are not continuous throughout the Henry Formation. As a result, test drilling is commonly required to locate an adequate

Surface Runoff Routes
That Exit the Base





Legend

- Glacial drift 50 to 100 ft thick with thin, discontinuous sand and gravel beds; over Pennsylvanian bedrock. Small ground-water supplies locally available.
- Glacial drift less than 50 ft thick with a few sand and gravel beds; over Pennsylvanian bedrock. Small ground-water supplies locally available.
- Continuous, permeable sand and gravel aquifers more than 30 ft thick. May provide large ground-water supplies.
- Continuous to discontinuous sand and gravel aquifers more than 15 ft thick. May provide moderate to large ground-water supplies.
- Thick glacial drift with scattered sand and gravel aquifers usually less than 15 ft thick. Small ground-water supplies usually available.

water supply. The thickness of these sand and gravel deposits ranges from 15 to 40 feet. Wells that tapped the Henry Formation were drilled to depths ranging from 30 to 65 feet. Prior to 1936, municipal wells that tapped the Henry Formation supplied water to the City of Springfield. Lake Springfield has served as Springfield's water supply since 1936 (Bergstrom et al, 1976).

Small groundwater supplies are available within the unconsolidated glacial till throughout Sangamon County and west-central Illinois. Wells that tap these sediments commonly produce low yields because of low porosity, low permeability, and thin sections of glacial deposits. The groundwater yields are sufficient for domestic use but are generally inadequate for municipal, industrial, or commercial purposes.

Bedrock aquifers that occur within the Pennsylvanian aged Carbondale and Modesto Formations concentrate within fractured sandstone, shale, and limestone. These aquifers encompass multiple fractured intervals at depths ranging from 30 to 200 feet. Water zones that are penetrated at depths below 200 feet are too highly mineralized for human consumption. Groundwater yields from depths of 30 - 200 feet are commonly a few gallons per minute and are only adequate for domestic purposes. Bedrock aquifers are usually used in areas where the surficial, unconsolidated sediments do not produce a sufficient groundwater supply (Bergstrom et al, 1976).

The aquifers that occur within the unconsolidated glacial sediments and the Pennsylvanian aged Carbondale and Modesto Formations are unconfined and hydraulically connected. Both aquifers are recharged locally by the infiltration of precipitation. The aquifers that occur within the previously described Henry Formation and the bedrock valleys are partially recharged by the downgradient movement and discharge of shallow groundwater within the glacial till deposits.

Recent conversations with hydrogeologists at the Illinois State Geological Survey, indicated that shallow groundwater within the glacial till and the bedrock aquifers near the bedrock/till interface should follow the natural topographic surface, flow downgradient, and discharge into the local streams. Construction borings and soil exploration pits at the Base encountered the water table from 1 to 15 feet below the land surface.

This shallow groundwater should flow to the east and discharge into Spring Creek.

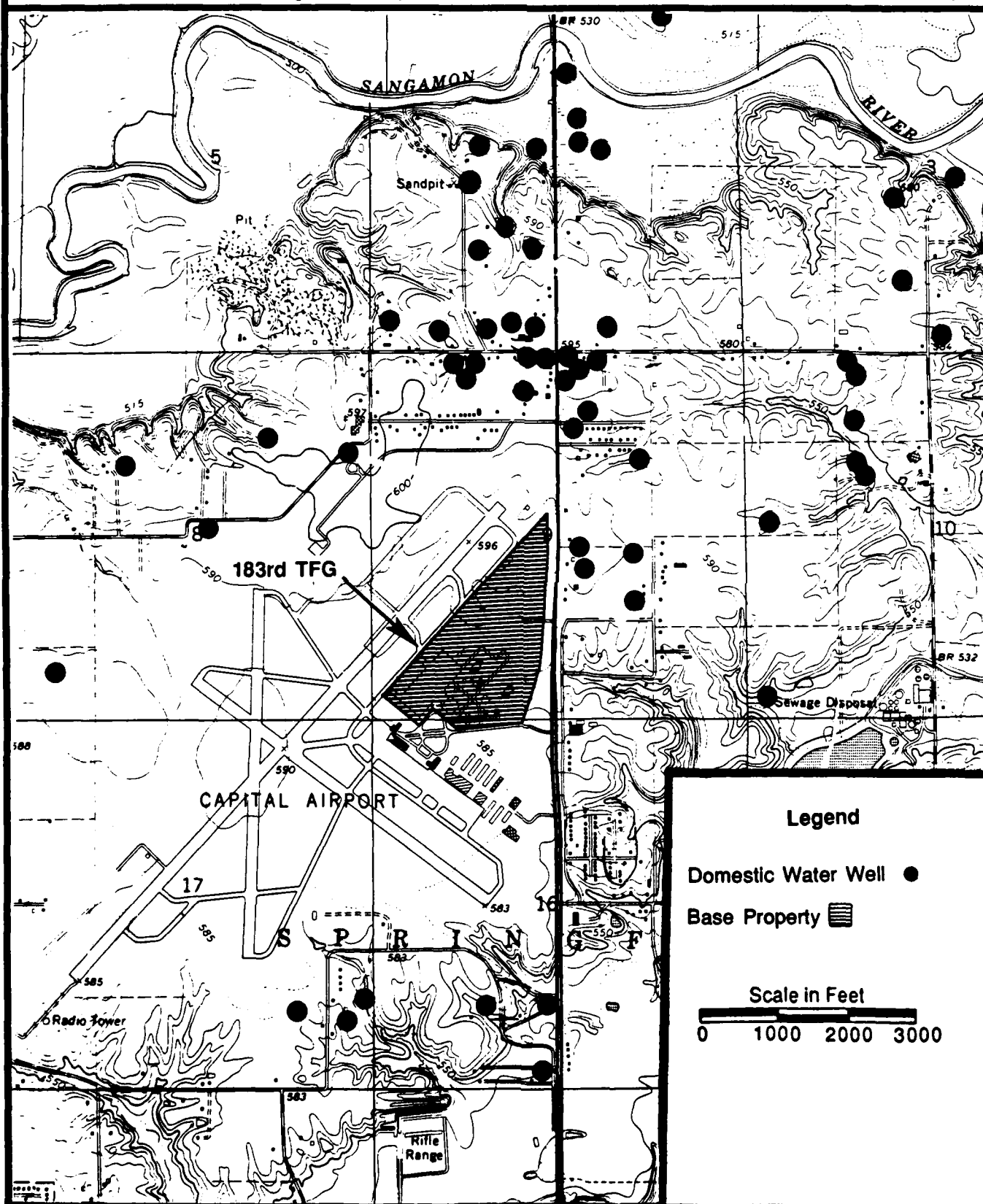
The groundwater flow direction within the deeper Pennsylvanian aged bedrock aquifers at the Base and in its vicinity has not been determined. However, conversations with hydrogeologists at the Illinois State Geological Survey indicated that within other areas of the Illinois Basin, the deeper Pennsylvanian aged aquifers flow downdip into the Basin. If this is true at the Base, the deeper bedrock aquifers should flow downdip to the southeast.

The water supply for the Base is municipal water that is purchased from the City of Springfield. Throughout the history of the Base (1948 to 1989), no water wells have been drilled on Base property. However, numerous water wells are located within the area surrounding the Base. The locations of these wells are illustrated in Figure 13. These wells supply water to residences. The wells are drilled from 30 to 100 feet deep, tap both the Glasford Formation and the underlying Carbondale Formation, and yield small volumes ranging from 1 to 10 gallons per minute.

Water samples that were collected from aquifers within the unconsolidated sediments and the underlying bedrock have been tested for water quality. The dissolved solids concentrations for aquifers within the unconsolidated sediments ranged from 350 to 700 ppm. The hardness of these aquifers ranged from 325 to 500 ppm. Groundwater within the Pennsylvanian aged bedrock is not as hard as water from aquifers within the unconsolidated sediment but is generally more mineralized.

E. Critical Environments

According to the Illinois Department of Conservation, Department of Natural Heritage, there are no endangered or threatened species within a 1-mile radius of the Base. Furthermore, no designated critical habitats occur within this area (Kruse, 1988). Information from the United States Fish and Wildlife Service in Illinois confirms this information (personal communication with Mr. Gerry Bade, U.S. Fish and Wildlife Service, Illinois, October 11, 1989).



IV. SITE EVALUATION

A. Activity Review

A review of Base records and interviews with Base personnel resulted in the identification of specific operations at the Base in which the majority of industrial chemicals are handled and hazardous wastes are generated. Fifteen past and present Base personnel with an average of 23 years tenure were interviewed. These personnel were representative of Civil Engineering; the Motor Pool; Aerospace Ground Equipment (AGE) Maintenance; the Fire Department; Petroleum, Oils, and Lubricants (POL) Management; Corrosion Control; Aircraft Maintenance; the Flightline; and Weapons Calibration. Table 1 summarizes these major operations, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal practices for the wastes. Based on the information gathered, any operation that is not listed in Table 1 has been determined to produce negligible quantities of wastes requiring disposal.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with Base personnel and subsequent site inspections resulted in the identification of two sites potentially contaminated with HM/HW. Figures 14 and 15 show the locations of the identified sites. Figure 14 is also a map of the Base.

The two sites were assigned a HAS according to HARM (Appendix D). A summary of the HAS for the scored sites is listed in Table 2. Copies of the completed Hazard Assessment Rating Forms are found in Appendix D. The objective of this assessment is to provide a relative ranking of sites suspected of contamination from hazardous substances. The final rating score reflects specific components of the hazard posed by a specific site: possible receptors of the contamination (e.g., population within a specified distance of the site and/or

**Table 1. Hazardous Materials/Hazardous Wastes Disposal Summary: Illinois
Air National Guard, Capital Airport, Springfield, Illinois**

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal					
			1950	1960	1970	1980		
Aircraft Maintenance (Bldgs P1, P17, & P26)	PD-680	400	-----	STORM-----	-----	SPLY-----	-----	DRMO
	Trichloroethane	200	-----	-----	STORM-----	-----	-----	DRMO----
	Carbon Cleaner	1000	-----	-----	STORM-----	-----	-----	DRMO----
	JP-4	2700	-----	OB-FTA-----	-----	-----	SPLY-----	DRMO
	7808 Oil	375	-----	-----	SPLY-----	-----	-----	DRMO
	Hydraulic Oil	100	-----	-----	SPLY-----	-----	-----	DRMO
	Engine Oil	375	-----	-----	SPLY-----	-----	-----	-----
	AVGAS	30	-----	GRND-----	-----	-----	NLU-----	-----
	Cleaning Compound	1000	-----	STORM-----	-----	-----	-----	NLU----

KEY:

- | | |
|-----------|--|
| CONTR | - Disposed of by a contractor |
| DIL SAN | - Disposed of through the sanitary sewer with large amounts of water |
| DRMO | - Disposed of through the Defense Reutilization & Marketing Office |
| GRND | - Disposed of on ground |
| NEUTR SAN | - Neutralized and disposed of through sanitary sewer |
| NLU | - No longer used |
| NO USES | - Material not in use at that time |
| OB-FTA | - Disposed of at the Off-Base Fire Training Area |
| OB-LNDFL | - Disposed of at the Off-Base landfill |
| SPLY | - Turned in to Base supply for recovery |
| STORM | - Disposed of through the storm sewer |
| TRASH | - Disposed of in general refuse |

Table 1. Hazardous Materials/Hazardous Wastes Disposal Summary: Illinois
Air National Guard, Capital Airport, Springfield, Illinois (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal			
			1950	1960	1970	1980
Aerospace Ground Equipment (AGE) (Bldg P2)	Engine Oil	50	-----	-----SPLY-----	-----SPLY-----	-----DRMO-----
	Hydraulic Oil	50	-----	-----SPLY-----	-----SPLY-----	-----DRMO-----
	Paint Strippers/Thinners	100	-----	-----STORM-----	-----STORM-----	-----DRMO-----
	JP-4	50	-----	-----SPLY-----	-----SPLY-----	-----DRMO-----
	Parts Cleaner	30	-----	-----STORM-----	-----CONTR-----	-----DRMO-----
	Motor Oil	25	-----	-----SPLY-----	-----SPLY-----	-----DRMO-----
	Gasoline	10	-----	-----STORM-----	-----STORM-----	-----NLU-----
	Battery Acid	10	-----	-----STORM-----	-----STORM-----	-----NEUTR/SAN-----
Weapons Maintenance (Bldgs P1 & P23)	Dry Cleaning Solvent	500	---NO USES---	-----STORM-----	-----STORM-----	-----CONTR-----
	Thinners/Lacquers	Unknown	-----	-----CONTR-----	-----CONTR-----	-----DRMO-----
	PD-680	50	-----	-----STORM-----	-----STORM-----	-----CONTR-----
	Trichloroethane	1100	-----	-----STORM-----	-----STORM-----	-----CONTR-----

KEY:

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OB-FTA - Disposed of at the Off-Base Fire Training Area
OB-LNDFL - Disposed of at the Off-Base landfill
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STORM - Disposed of through the storm sewer
TRASH - Disposed of in general refuse

Table 1. Hazardous Materials/Hazardous Wastes Disposal Summary: Illinois
Air National Guard, Capital Airport, Springfield, Illinois (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal	1950	1960	1970	1980	1988
Corrosion Control (Bldg P17)	PD-680	100	Building constructed in 1970			-STORM-	-----CONTR-----	
	Thinners	50					-----CONTR-----	
	Paint Strippers	35					-----STORM-----	-CONTR
	Lacquer	50					-----CONTR-----	
	Aliphatic Naphtha	80					-----CONTR-----	
	Acids	Unknown					-----DIL SAN-----	
	Enamel Thinner	25					-----CONTR-----	----TRASH----
	Aircraft Cleaning Compound	1000					-----STORM-----	
	Paint Containers (Residual)	50					-----TRASH-----	
Electric Shop (Bldg P1)	Potassium Hydroxide	8		--NO USES----		-----STORM-----	----NLU-----	
Battery Shop (Bldg P1)	Used Batteries					-----SPLY-----	-----	
	Battery Acid					-----STORM-----	----NEUTR/SAN----	

KEY:

- CONTR - Disposed of by a contractor
- DIL SAN - Disposed of through the sanitary sewer with large amounts of water
- DRMO - Disposed of through the Defense Reutilization & Marketing Office
- GRND - Disposed of on ground
- NEUTR SAN - Neutralized and disposed of through sanitary sewer
- NLU - No longer used
- NO USES - Material not in use at that time
- OB-FTA - Disposed of at the Off-Base Fire Training Area
- OB-LNDFL - Disposed of at the Off-Base landfill
- SPLY - Turned in to Base supply for recovery
- STORM - Disposed of through the storm sewer
- TRASH - Disposed of in general refuse

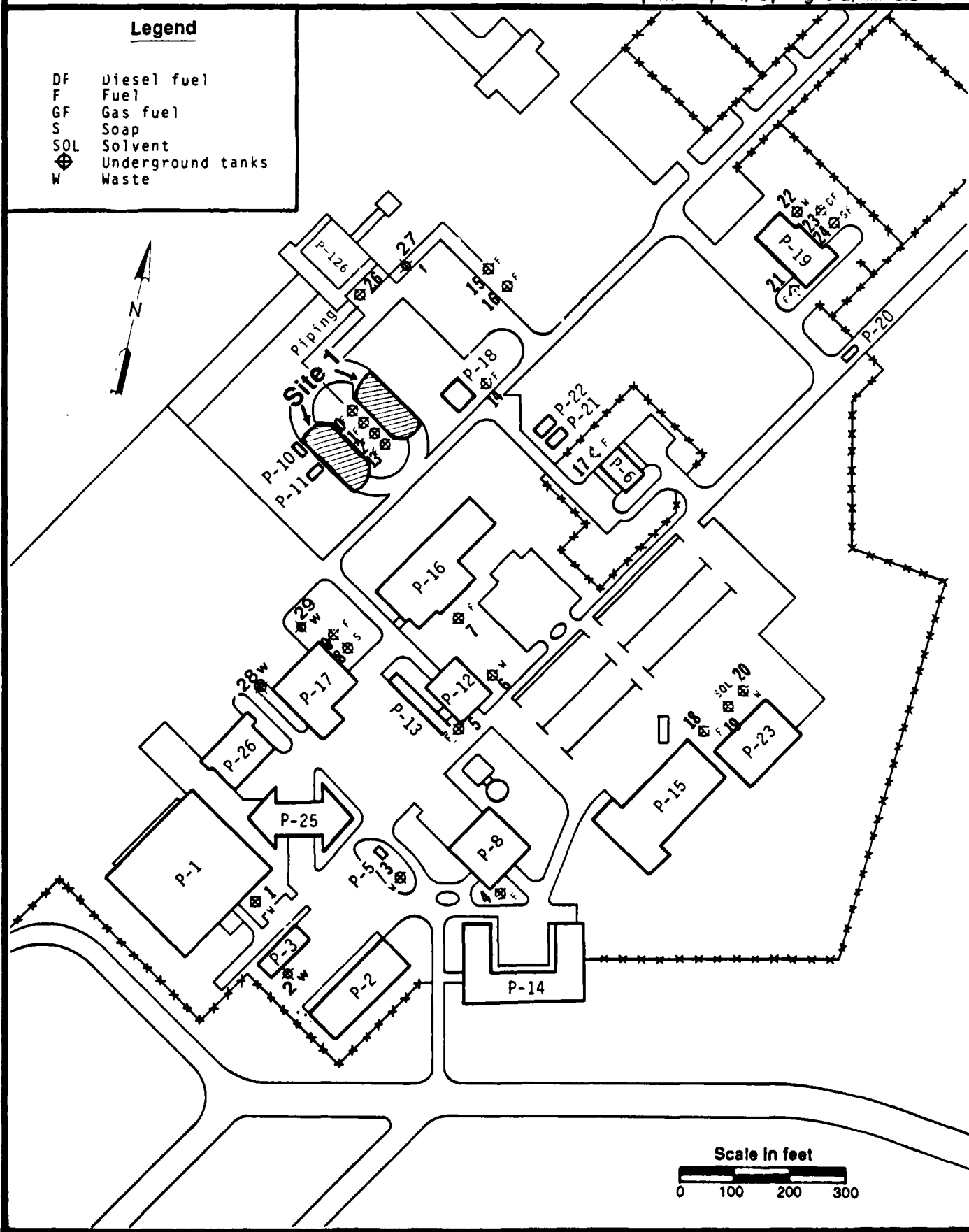
HMTC

Source: 183rd TFG Base Map

Figure 14
Location of Site No. 1, 183rd TFG,
Illinois Air National Guard,
Capital Airport, Springfield, Illinois

Legend

DF Diesel fuel
F Fuel
GF Gas fuel
S Soap
SOL Solvent
⊕ Underground tanks
W Waste



SciTek

Source: USGS, 1965.

Figure 15
Location of Site No. 2, 183rd TFG,
Illinois Air National Guard,
Capital Airport, Springfield, Illinois

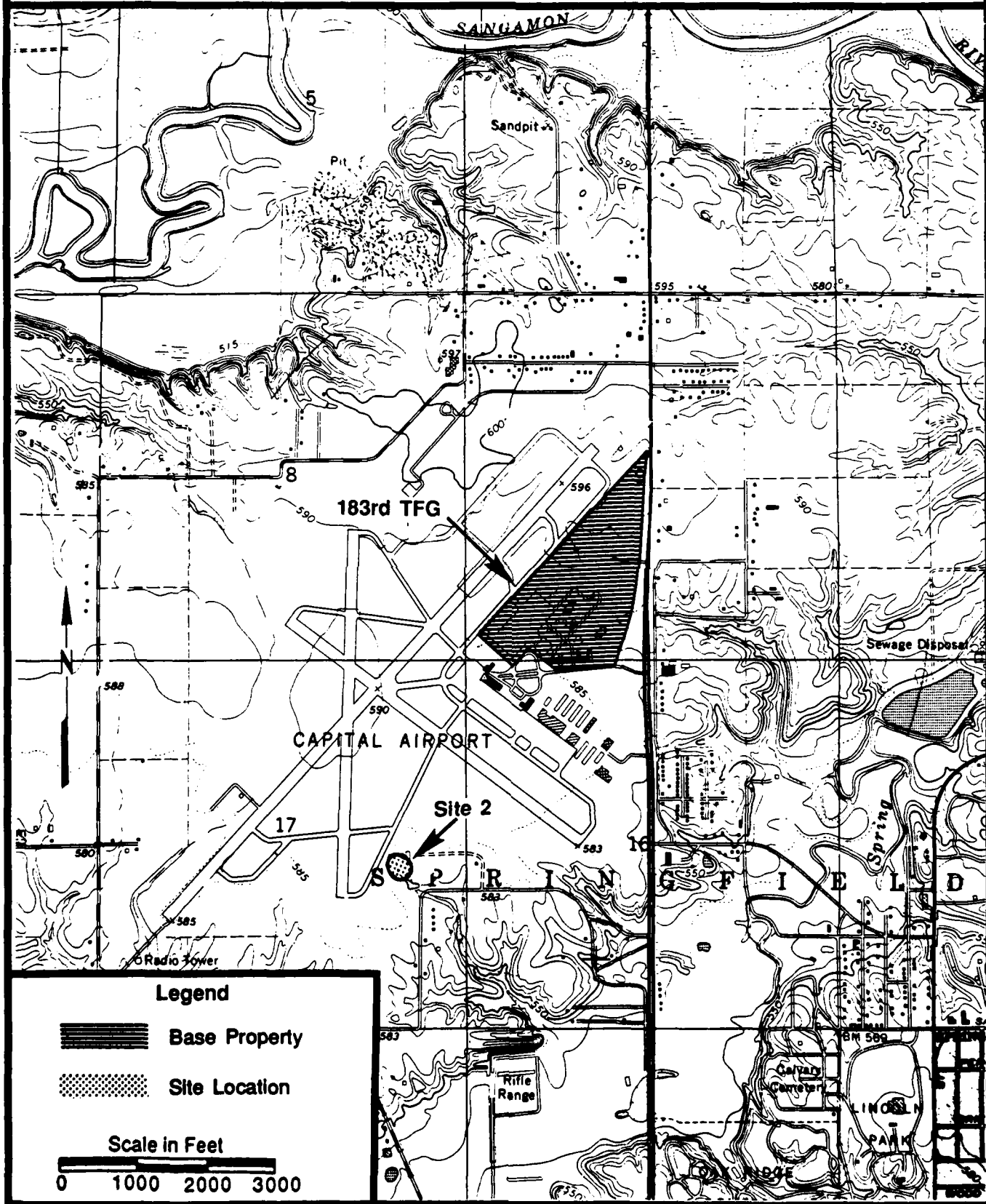


Table 2. Site Hazard Assessment Scores (as Derived from HARM): Illinois
Air National Guard, Capital Airport, Springfield, Illinois.

<u>Site No.</u>	<u>Site Description</u>	<u>Receptors</u>	<u>Waste Characteristics</u>	<u>Pathway</u>	<u>Waste Mgmt. Practices</u>	<u>Overall Score</u>
1	POL Storage Area	55	80	80	0.95	68
2	Old Fire Training Area	48	100	80	1.0	76

critical environments within a 1-mile radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding). A description of the sites follows:

Site No. 1 - POL Storage Area (HAS-68)

The POL storage area is located on the northwest side of the Base. A major spill occurred at the POL facility sometime between 1958 and 1959 when an underground fuel pump leaked approximately 3100 gallons of JP-4 onto the ground. The Base Fire Department was called to clean up the spill, but very little fuel was recovered. The fuel was covered with foam, diluted with water, and washed down a storm drain discharging to the tributary east of the Base. Some fuel soaked into the ground surrounding the POL facility.

Minor fuel spills (10 to 50 gallons) were reported before 1981 in the POL area. Three spills were from truck overfills and from operations during unloading delivery trucks. These spills were washed down to the grass or rocky area away from the drains.

During daily fueling operations, frequent spills to the ground have occurred. Each involved a small quantity (one to two gallons) of JP-4.

There are six underground POL storage tanks. Four of the tanks are north of Building P-11 and two are located north of Building P-18. The six underground POL storage tanks were inspected in 1985 and no leaks were detected. Figure 14 illustrates the locations of these USTs.

Site No. 2 - Old Fire Training Area (HAS-76)

The Old Fire Training Area is located east of the approach end of Runway 36 and approximately 120 feet north of a small pond and creek located on the south side of the Airport on Airport property. The Base conducted operations at the Old FTA from 1949 to 1974. The old FTA is currently covered by a concrete aircraft parking apron.

In 1974 the Base stopped using the Old FTA and moved operations to the newer FTA. The newer FTA is located west-northwest of the approach end of Runway 18 on Airport property.

The Base conducted fire training operations at the Old FTA approximately twice a month. During a typical fire training exercise, the Base burned 200 to 300 gallons of flammable liquids that may have included any of the following: JP-2 and JP-3 fuel, paints, paint strippers, solvents, and other flammables from the various shops. A minimum amount of water may have been sprayed onto the FTA before the flammables were poured on the site and ignited.

Assuming that approximately 70% of the fuel was burned during operations and 30% remained, 36,000 to 54,000 gallons of fuel may have been available to either volatilize or soak into the ground during use of the Old FTA. During the site visit, there was no visible evidence of contamination.

C. Other Pertinent Information

- o Effluent from the oil/water separator (OWS) at the Hush House (Building P-126) discharges directly into the storm drainage system.
- o Twenty-eight Underground Storage Tanks (USTs) exist on the Base. Figure 14 illustrates the locations of these USTs. The UST inventory is located in Appendix E.
- o The Base has never operated any kind of landfill. All municipal and sanitary wastes are picked up by a city contractor.

V. CONCLUSIONS

Information obtained through interviews with 15 past and present Base personnel, review of Base records, and field observations has resulted in the identification of two potential HM/HW sites at the Base. The potentially contaminated sites are Site No. 1 - POL Storage Area (HAS-68) and Site No. 2 - Old Fire Training Area (HAS-76).

These sites are potentially contaminated with HM/HW and exhibit the potential for contaminant migration to groundwater and surface water. Therefore, these sites were assigned a HAS according to HARM.

VI. RECOMMENDATIONS

Further IRP investigations are recommended for Site No. 1 - POL Storage Area and for Site No. 2 - Old Fire Training Area.

GLOSSARY OF TERMS

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

ARGILLACEOUS - Containing clay-size particles or clay minerals.

CAMBRIAN - The earliest period of the Paleozoic era. It spanned the time between 570 and 500 million years ago.

CONTAMINANT - As defined by Section 101(f) (33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

- (a) any substance designated pursuant to Section 311(b) (2) (A) of the Federal Water Pollution Control Act,
- (b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,
- (c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

- (d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,
- (e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and
- (f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substances Control Act;

and shall not include natural gas, liquified natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CRITICAL HABITAT - The specific areas within the geographical area occupied by the species on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection.

DEVONIAN - A period of the Paleozoic era (after the Silurian and before the Mississippian). It spanned the time between 400 and 345 million years ago.

DISCHARGE - The release of any waste stream or any constituent thereof to the environment.

DOWNGRADIANT - A direction that is hydraulically downslope.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection would present an overwhelming and overriding risk to man.

FACIES - The aspect, appearance, and characteristics of a rock unit, usually reflecting the conditions of its origin.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (DEQPPM 81-5, December 11, 1981).

HAS - Hazard Assessment Score - The score developed by using the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

- a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or
- b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HYDRAULIC GRADIENT - The difference in head (elevation of water surface) at two points divided by the distance between these two points.

ILLINOIAN - Pertaining to the classical third glacial stage of the Pleistocene Epoch in North America; dated approximately 200,000 - 130,000 years ago.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal proportions of sand, silt, and clay particles and usually containing organic matter.

LOESS - A widespread, homogeneous, commonly nonstratified, porous, friable, slightly coherent, usually highly calcareous, fine-grained blanket deposit (generally less than 30 inches thick).

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

ORDOVICIAN - The second earliest period (440 - 500 million years ago) of the Paleozoic era (after the Cambrian and before the Silurian).

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

SILT - A rock fragment or detrital particle smaller than a very fine sand grain and larger than coarse clay.

SILURIAN - A period of the Paleozoic. It spanned the time between 440 and 400 million years ago.

STRATA - Distinguishable horizontal rock layers separated vertically from other layers.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and man-made features.

UNCONFORMITY - A substantial break or gap in the geologic record where a rock unit is overlain by another that is not next in stratigraphic succession, such as an interruption in the continuity of a depositional sequence of sedimentary rocks or a break between eroded igneous rocks and younger sedimentary strata.

UPGRADIENT - A direction that is topographically or hydraulically upslope.

VALLEY FILL - The unconsolidated sediment deposited by any agent so as to fill or partially fill a valley.

WATER TABLE - The surface between the zone of saturation and the zone of aeration; that surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.

WETLANDS - Those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

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- Miller, J. A. Quaternary History of the Sangamon River Drainage System, Central Illinois. Illinois State Museum. Reports of Investigations No. 27, 1973.
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- Professional Service Industries, Inc. Soils Exploration and Foundation Recommendations for the Proposed Weapons Calibration Shop and Fire House Security Building, Illinois Air National Guard, Capital Airport, Springfield, Illinois. A & H Engineering Division in Springfield, Illinois, January 5, 1983.
- Selkregg, L. F. and J. P. Kempton. Groundwater Geology in East Central Illinois - A Preliminary Geologic Report. Illinois State Geological Survey, Circular 248, 1958.

Steinkamp, J. F. Soil Survey of Sangamon County, Illinois. United States Department of Agriculture, Soil Conservation Service, 1980.

United States Department of Defense. Defense Environmental Quality Program Policy Memorandum (DEQPPM 81-5), December 11, 1981.

United States Environmental Protection Agency. National Oil and Hazardous Substances Contingency Plan. Subpart H. 47 Federal Register 31235, July 16, 1982.

United States Geological Survey. Springfield West, Illinois Quadrangle. 7.5 Minute Series (Topographic), 1965.

Willman, H. B., E. Atherton, T. C. Buschbach, C. Collinson, J. C. Frye, M. E. Hopkins, J. A. Lineback, and J. A. Simon. Handbook of Illinois Stratigraphy. Illinois State Geological Survey Bulletin 95, 1975.



Appendix A

Resumes of Search Team

Members

GRACE E. HILL

EDUCATION

B.S. (enrolled), Environmental Science, University of the District of Columbia
A.S., Marine Science, University of the District of Columbia, 1984

CERTIFICATION

Health & Safety Training Level C

EXPERIENCE

Seven years of experience in various environmental and hazardous waste disciplines including Preliminary Assessments, Remedial Investigations, and Feasibility Studies at Superfund sites, RCRA Facility Assessments, Initial Assessment Studies under the Naval Environmental Energy Study Assessment (NEESA), Region IV Compliance investigation for subsequent legal actions, Information Specialist for the EPA/Superfund Hotline, and assisting in the management of REM/FIT zone contracts.

Performed as task leader for the Blue Plains WWTP Biomonitoring Project consisting of laboratory setup, monitoring test organisms, conducting toxicity tests, and preparation of weekly and monthly reports.

EMPLOYMENT

Dynamac Corporation (1988-present): Environmental Scientist

In working for Dynamac's Hazardous Materials Technical Center (HMTc), performs Preliminary Assessments, Remedial Investigations, and Feasibility Studies (PA/RI/FS) under the Air National Guard Installation Restoration Program. Specifically involved in preparing reports detailing site investigation findings, determining rates and extent of contamination, and recommendations for Phase II monitoring and soil sampling.

Participated in a remedial investigation/feasibility study at a Superfund site in Puerto Rico to ascertain the alleged extent of mercury contamination.

C.C. Johnson & Malhotra, P.C. (1985-1988): Environmental Technician

Task leader for the Blue Plains WWTP Biomonitoring Project consisting of laboratory setup, monitoring test organisms, conducting toxicity tests, and preparation of weekly and monthly reports. Participated in groundwater monitoring, well installation and development at Independent Nail, SC, Superfund site. Conducted RCRA Facility Assessments (RFAs) under EPA's REM III Project for Regions I and IV. Performed literature search, site investigations, sample collection, CLP coordination, health and safety plan preparation, data analysis, and document preparation. Participated on a team involved in the research and organization of compliance documents for subsequent legal actions. Participated in the preparation of an RI/FS consisting of surveying and soil, sediment, surface water and groundwater sampling, groundwater contamination migration determination, and residential well sampling at Geiger C&M Oil, SC, DeRewal, NJ, and Limestone Road,

MD, Superfund sites. Assisted in the final preparation of the Initial Assessment Studies under the Navy's hazardous waste control program (NEESA) at three Navy facilities.

Geo/Resource Consultants (1984-1985): Environmental Assistant

Information Specialist for the EPA's RCRA/Superfund Hotline involved in technical assistance regarding federal and state regulations and the requirements necessary for the management of hazardous waste, for industry and the public.

Environmental Protection Agency (1981-1984): Intern

As an environmental intern, assisted Field Investigation Team (FIT) Deputy Project Officers in the management of REM/FIT zone contracts. Specifically involved in the evaluation of completed FIT projects, assistance in the award fee process, evaluation of FIT well drilling procedures, development of analytical documents for RCRA 3012 Cooperative Agreement Program, involving the development of a tracking system of the State agencies use of funds for hazardous waste cleanup.

BRUCE W. BEACH

EDUCATION

M.Sc., Geological Engineering, Colorado School of Mines, 1982
B.S., Geological Engineering, Colorado School of Mines, 1979
B.A., Geology, University of Connecticut, 1974

SPECIALIZED TRAINING

Honor graduate, advanced construction methods, Military Engineer Schools, Fort Belvoir, 1974-1977

EXPERIENCE

Thirteen years of experience in geologic engineering, with a solid background in geologic problem solving and project completions. Experienced in groundwater, soils, hydrology, seismic risk, foundation, and hydrocarbon exploration projects. Has utilized stratigraphic and tectonic modeling, regional analysis including Landsat and other remote-sensed data, and site-specific data evaluations. Has been responsible for project schedule maintenance, cost accounting, client development, technical presentations, drilling and engineering management and well site field operations.

EMPLOYMENT

Dynamac Corporation (1987-present): Hydrogeologist/Geological Engineer

Reviewed analytical and numerical models for surface water and groundwater pollution assessment. Assisted on development of a new compound-specific, hazard ranking system and on the review and compilation of physical-chemical data used in fate and transport modeling. Prepared specifications for monitoring and recovery well design for remedial action cleanup. Coordinated and reviewed hydrogeologic site characterization assessments of more than 200 Subtitle D waste facilities. Evaluated regulatory concentration values based on calculations for the subsurface fate and transport model developed for OSW. Provides support for contracts in the areas of geological engineering, water resource engineering, and groundwater and surface water hydrology.

Earth Satellite Corporation (1986-1987): Geological Engineer

Abstracted engineering research and reviewed technology transfer programs that utilized analysis of Landsat imagery for water resources and engineering projects. Presented seminar on water quality assessment and analysis with remotely-sensed data. Prepared technical report on Landsat analysis for use in water quality evaluations. Supplied technical support and explanation for national and international marketing efforts.

Self-employed (1982-1986): Consultant Geologist

Organized regional geologic evaluations; integrated subsurface analysis, tectonic interpretation from Landsat imagery review, and well-log evaluation. Coordinated successful multiphase exploration programs from prospect generation, through land acquisition, to well completions and production operations. Worked with state personnel developing site-specific erosion prevention and pollution abatement plans. Reviewed and implemented well construction and abandonment plans. Prepared project reports for quarterly cost accounting, and advised clients and investors in technical areas. Supervised in-office and field personnel for data gathering, information organization, and report preparation.

J.W. Patterson & Assoc., Inc. (1980-1981): Geological Engineer

Evaluated all phases of groundwater resource development, including project planning, well design, cost accounting, drilling operations, and report preparation. Supervised and was responsible for efficient completion of field programs involving evaluations of damsite investigations and hazardous waste disposal sites. Conducted geotechnical evaluations involving geologic mapping, core logging, and analyzing permeability data. Prepared site characterization reports for sites in New Mexico, New Jersey, and Colorado.

Bureau of Reclamation (1978-1980): Geologist

Evaluated seismic risk potential to Bureau projects. Programs involved literature research, aerial photo analysis, geophysical data reduction, Quaternary geologic mapping, and trench logging. Analyzed regional structural studies and developed concepts of regional tectonic style and deformation histories. Assisted with development of screening model to assess regional seismic risk.

U.S. Army (1974-1977): Soils/Terrain Analyst

Prepared graphic and narrative presentation of engineering data on soils, hydrology, and geology for terrain intelligence studies. Researched geologic and soil studies, and interpreted field and remote-sensed data. Supervised construction testing laboratory, providing quality control on soils, asphalt, and concrete materials. Managed geologic and soils data analysis section for operations planning.

PUBLICATIONS

Reconnaissance geology and geologic hazards maps of the Canon City quadrangle, Colorado. Colorado Geological Survey, Open File 83-42 pls.

Reconnaissance geology and geologic hazards maps of the Florence quadrangle, Colorado. Colorado Geological Survey, Open File 83-52 pls.

Groundwater development in East Africa using Landsat. Landsat Applications Note. EOSAT. January 1987.

B.W. BEACH
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TECHNICAL REPORTS

Damsite Investigation at Ruidoso, NM. Bureau of Indian Affairs. 1980-1981.

Field Investigation. Industrial Landfill, Raritan River, NJ. 1980-1981.

Remote Sensing Applications for Ground Water Exploration. Earth Satellite Corporation. 1987.

KATHRYN A. GLADDEN

(Version A)

EDUCATION

Graduate coursework in Engineering, University of Washington, 1980-1982
B.S., Chemical Engineering (minor in Biological Sciences), University of
Washington, 1978

SPECIALIZED TRAINING

OSHA Hazardous Waste Site Health and Safety Training Course

SECURITY CLEARANCE

Secret DOD clearance

EXPERIENCE

Nine years of chemical engineering experience specializing in hazardous waste management and industrial process engineering. Experience includes conducting CERCLA Preliminary Assessments and RCRA hazardous waste minimization projects at DOD facilities, developing Background Documents for listing of hazardous waste streams under RCRA, and performing environmental audits and process optimization projects at manufacturing plants.

EMPLOYMENT

Dynamac Corporation (1985-present): Senior Staff Engineer

Provides technical support to federal clients for CERCLA Preliminary Assessments (PA), Site Investigations (SI), Remedial Investigations (RI), and Feasibility Studies (FS). Responsibilities include inspection of suspected hazardous waste sites, analyses of risks from exposure to site contaminants, and development of technical and contractual requirements for SI/RI/FS programs.

Principal Investigator for the development of industrial solvent use, storage, and disposal guidance for the U.S. Army Materiel Command. Conducted onsite audits at seven U.S. Army facilities, recommended modifications in operating procedures and product substitutions for reducing waste solvent generation, and developed a computerized model for selecting the most economical methods of reclamation for various categories of solvents.

Conducted analysis of public comments on Advanced Notice of Public Rulemaking to establish National Primary Drinking Water Regulations for radionuclide contaminants.

Peer Consultants (1984-1985): Staff Engineer

Developed Background Documents for listing under RCRA of hazardous waste streams from the plastics industry. Responsible for developing test programs; and evaluating analytical, industrial process questionnaire, health, and environmental effects data.

Engineering Science (1983-1984): Staff Engineer

Conducted regulatory policy review and technology assessment of transportation and decontamination procedures for acutely hazardous wastes. Project engineer for development of a cost analysis methodology for the U.S. Army Toxic and Hazardous Materials Agency Installation Restoration Program.

Weyerhaeuser Company (1978-1983): Project Chemical Engineer

Chemical engineer responsible for process optimization projects at pulp and paper manufacturing facilities including:

- o Conducted environmental audits at pulp manufacturing facilities to establish in-plant effluent loads.
- o Developed capital alternatives and improved operating procedures for in-plant effluent load reduction.
- o Responsible for development and implementation of recommendations for plant energy conservation programs, including optimization of a pulp dryer steam supply and condensate removal system that resulted in a two percent increase in plant production capacity.
- o Member of a team starting up and operating a pulp manufacturing facility for five months.

PROFESSIONAL AFFILIATIONS

Tau Beta Pi Engineering Honorary
Society of Women Engineers

MARK D. JOHNSON

EDUCATION

B.S., Geology, James Madison University, 1980

EXPERIENCE

Eight years' technical and management experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance, preparation of statements of work for environmental field monitoring and feasibility studies for the Air Force and the Air National Guard, development of environmental field monitoring programs, and preparation of Preliminary Assessments for the Air National Guard.

EMPLOYMENT

Dynamac Corporation (1984-present): Senior Staff Scientist/Geologist

Primarily responsible for developing and managing technical support programs relevant to CERCLA related activities for the Air Force, Air National Guard, Department of Justice and Coast Guard. These activities include Statements of Work for Site Investigations (SI), Remedial Investigations (RI), and Feasibility Studies (FS); assessing groundwater at hazardous waste disposal/spill sites for the purpose of determining rates and extents of contaminant migration and for developing SI and RI programs and identifying remedial actions; reviewing SI, RI and FS contractor work plans for various government clients, developing technical and contractual requirements for SI, RI and FS projects, managing the development and preparation of Preliminary Assessments, and assisting clients in the development of their environmental management programs, which included preparation of the Air Force's Installation Restoration Program Management Guidance document.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

M.D. JOHNSON
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PROFESSIONAL CREDENTIALS

Registered Professional Geologist, South Carolina, #116, 1987

PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
National Water Well Association/Association of Ground Water Scientists
and Engineers

RAYMOND G. CLARK, JR.

EDUCATION

Completed graduate engineering courses, George Washington University, 1957
B.S., Mechanical Engineering, University of Maryland, 1949

SPECIALIZED TRAINING

Grad. European Command Military Assistance School, Stuttgart, 1969
Grad. Army Psychological Warfare School, Fort Bragg, 1963
Grad. Sanz School of Languages, D.C., 1963
Grad. DOD Military Assistance Institute, Arlington, 1963
Grad. Defense Procurement Management Course, Fort Lee, 1960
Grad. Engineer Officer's Advanced Course, Fort Belvoir, 1958

CERTIFICATIONS

Registered Professional Engineer: Kentucky (#4341); Virginia (#8303);
Florida (#36228)

EXPERIENCE

Thirty-one years of experience in engineering design, planning and management including construction and construction management, environmental, operations and maintenance, repair and utilities, research and development, electrical, mechanical, master planning and city management. Over six years' logistical experience including planning and programming of military assistance materiel and training for foreign countries, serving as liaison with American private industry, and directing materiel storage activities in an overseas area. Over two years' experience as an engineering instructor. Extensive experience in personnel management, cost reduction programs, and systems improvement.

EMPLOYMENT

Dynamac Corporation (1986-present): Program Manager/Department Manager

Responsible for activities relating to Preliminary Analysis, Site Investigations, Remedial Investigations, Feasibility Studies, and Remedial Action for the Installation Restoration Program for the U.S. Air Force, Air National Guard, Bureau of Prisons, and the U.S. Coast Guard, including records search, review and evaluation of previous studies; preparation of statements of work, feasibility studies; preparation of remedial action plans, designs and specifications; review of said studies/plans to ensure that they are in conformance with requirements; review of environmental studies and reports; preparation of Air Force Installation Restoration Program Management Guidance; and preparation of Part B permits.

Howard Needles Tammen & Bergendoff (HNTB) (1981-1986): Manager

Responsible, as Project Manager, for: design of a new concourse complex at Miami International Airport to include terminal building, roadway system, aircraft apron, drainage channel relocation, satellite building with underground pedestrian tunnel, and associated underground utility corridors, to include subsurface aircraft fueling systems, with an estimated construction cost of \$163 million; a cargo vehicle tunnel under the crosswind runway with an estimated construction cost of \$15 million; design and construction of two large corporate jet aircraft hangars; and for the hydrocarbon recovery program to include investigation, analysis, design of recovery systems, monitoring of recovery systems, and planning and design of residual recovery systems utilizing biodegradation. Participated, as sub-consultant, in Air Force IRP seminar.

HNTB (1979-1981): Airport Engineer

Responsibilities included development of master plan for Iowa Air National Guard base; project initiation assistance for a new regional airport in Florida; engineering assistance for new facilities design and construction for Maryland Air National Guard; master plan for city maintenance facilities, Orlando, Florida; in-country master plan and preliminary engineering project management for Madrid, Spain, International Airport; and project management of master plan for Whiting Naval Air Station and outlying fields in Florida.

HNTB (1974-1979): Design Engineer

Responsibilities included development of feasibility and site selection studies for reliever airports in Cleveland and Atlanta; site selection and facilities requirements for the Office of Aeronautical Charting and Cartography, NOAA; and onsite mechanical and electrical engineering design for terminal improvements at Baltimore-Washington International Airport, Maryland.

HNTB (1972-1974): Airport Engineer

Responsible for development of portions of the master plan and preliminary engineering for a new international airport for Lisbon, Portugal, estimated to cost \$250 million.

Self-employed (1971-1972): Private Consultant

Responsible for engineering planning and installation of a production line for multimillion-dollar contract in Madrid, Spain, to fabricate transmissions and differentials for U.S. Army vehicles.

U.S. Army, Corps of Engineers (1969-1971): Chief, Materiel & Programs

Directed materiel planning and military training programs of military assistance to the Spanish Army. Controlled arrival and acceptance of materiel by host government. Served as liaison/advisor to American industry interested

in conducting business with Spanish government. Was Engineer Advisor to Spanish Army Construction, Armament and Combat Engineers, also the Engineer Academy and Engineer School of Application.

Corps of Engineers (1968-1969): Chief, R&D Branch, OCE

Directed office responsible to Chief of Engineers for research and development. Developed research studies in new concepts of bridging, new explosives, family of construction equipment, night vision equipment, expedient airfield surfacing, expedient aircraft fueling systems, water purification equipment and policies, prefabricated buildings, etc. Achieved Department of Army acceptance for development and testing of new floating bridge. Participated in high-level Department Committee charged with development of a Tactical Gap Crossing Capability Model.

Corps of Engineers (1967-1968): Division Engineer

Facilities engineer in Korea. Was fully responsible for management and maintenance of 96 compounds within 245 square miles including 6,000+ buildings, 1 million linear feet of electrical distribution lines, 18 water purification and distribution systems, sanitary sewage disposal systems, roads, bridges, and fire protection facilities with real property value of more than \$256 million. Planned and developed the first five-year master plan for this area. Administered \$12 million budget and \$2 million engineer supply operation. Was in responsible charge of over 500 persons. Developed and obtained approval for additional projects worth \$9 million for essential maintenance and repair. Directed cost reduction programs that produced more than \$500,000 savings to the United States in the first year.

Corps of Engineers (1963-1967): Engineer Advisor

Engineer and aviation advisor to the Spanish Army. Developed major modernization program for Spanish Army Engineers, including programming of modern engineer and mobile maintenance equipment. Directed U.S. portion of construction, testing and acceptance of six powder plants, one shell loading facility, an Engineer School of Application, and depot rebuild facilities for engineer, artillery, and armor equipment. Planned and developed organization of a helicopter battalion for the Spanish Army. Responsible for sales, delivery, assembly and testing of 12 new helicopters in country. Provided U.S. assistance to unit until self-sufficiency was achieved. Was U.S. advisor to Engineer Academy, School of Application and Polytechnic Institute.

Corps of Engineers (1960-1963): Deputy District Engineer

Responsible for planning and development of extensive construction projects in the Ohio River Basin for flood control and canalization, including dam, lock, bridge, and building construction, highway relocation, watershed studies, real estate acquisitions and dispositions. Was contracting officer for more than \$75

million of projects per year. Supervised approximately 1,300 personnel, including 300 engineers. Planned and directed cost reduction programs amounting to more than \$200,000 per year. Programmed and controlled development of a modern radio and control net in a four-state area.

Corps of Engineers (1959-1960): Area Engineer

Directed construction of a large airfield in Ohio as Contracting Officer's representative. Assured that all construction (runway, steam power plant, fuel transfer and loading facilities, utilities, buildings, etc.) complied with terms of plans and specifications. Was onsite liaison between Air Force and contractors.

Corps of Engineers (1958-1959): Chief, Supply Branch

Managed engineer supply yard containing over \$21 million construction supplies and engineer equipment. Directed in-storage maintenance, processing and deprocessing of equipment. Achieved complete survey of items on hand, a new locator system and complete rewarehousing, resulting in approximately \$159,000 savings in the first year.

Corps of Engineers (1957-1958): Student

U.S. Army Engineer School, Engineer Officer's Advanced Course.

Corps of Engineers (1954-1957): Engineer Manager

Managed engineer construction projects and was assigned to staff and faculty of the Engineer School. Was in charge of instruction on engineer equipment utilization, management and maintenance. Directed Electronic Section of the school. Coordinated preparation of five-year master plan for the Department of Mechanical and Technical Equipment.

Corps of Engineers (1949-1954): Engineer Commander

Positions of minor but increasing importance and responsibility in engineering management, communications, demolitions, construction administration and logistics.

PROFESSIONAL AFFILIATIONS

Member, National Society of Professional Engineers
Fellow, Society of American Military Engineers
Member, American Society of Civil Engineers
Member, Virginia Engineering Society
Member, Project Management Institute

R.G. CLARK, JR.
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HARDWARE

IBM PC

SOFTWARE

Lotus 1-2-3, D Base III Plus, Framework, Project Scheduler 5000, Harvard
Project Manager, Volkswriter, Microsoft Project



Appendix B

Outside Agency

Contact List

OUTSIDE AGENCY CONTACT LIST

Crawford, Murphy, and Tilly, Inc.
Engineering Consultants
2750 W. Washington Street
Springfield, Illinois 62702
Greg Heaton (217) 787-8050

Illinois Department of Conservation
Department of Natural Heritage
524 South Second Street
Springfield, Illinois 62701-1787
(217) 782-6384

Illinois State Geological Survey
615 East Peabody Drive
Champaign, Illinois 61820
(217) 333-4747

Illinois State Water Survey
Ground-Water Section
2204 Griffith Drive
Champaign, Illinois 61820-7495
Kay Mumm (217) 333-4300

National Oceanic and Atmospheric Administration
National Weather Service Office
4 North Airport Drive
Springfield, Illinois 62707
(217) 492-4949

Office of Public Utilities
Municipal Building
Springfield, Illinois 62701
(217) 789-2000

United States Department of Agriculture
Soil Conservation Service
40 Adloff Lane
Springfield, Illinois 62703
(217) 492-4015

United States Fish and Wildlife Service
1830 Second Avenue
Rock Island, Illinois 61201
Gerry Bade (309) 793-5800

OUTSIDE AGENCY CONTACT LIST (continued)

United States Geological Survey
12201 Sunrise Valley Drive
Reston, Virginia 22092
(703) 648-4000

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Appendix C

USAF Hazard Assessment Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has developed a comprehensive program to identify, evaluate, and control hazardous waste disposal practices associated with past waste disposal techniques at DoD facilities. One of the actions required under this program is to:

Develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, December 11, 1981).

Accordingly, the U.S. Air Force has sought to establish a system to set priorities for taking further action at sites based upon information gathered during the Preliminary Assessment phase of the Installation Restoration Program.

PURPOSE

The purpose of the site rating model is to assign a ranking to each site where there is suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-up site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous waste present in sufficient quantity), and (2) potential for migration exists. A site may be deleted from ranking consideration on either basis.

DESCRIPTION OF THE MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing

the hazards at a given site, the model develops a score based on the most likely routes of contamination and worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors presented in this appendix. The site rating form and the rating factor guidelines are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: (1) possible receptors of the contamination, (2) the waste and its characteristics, (3) the potential pathways for contaminant migration, and (4) any effort that was made to contain the waste resulting from a spill.

The receptors category rating is based on four rating factors: (1) the potential for human exposure to the site, (2) the potential for human ingestion of contaminants should underlying aquifers be polluted, (3) the current and anticipated use of the surrounding area, and (4) the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows:

receptors subscore = $(100 \times \text{factor subtotal} / \text{maximum score subtotal})$.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst

case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score while scores for solids are reduced.

The pathways category rating is based on evidence of contaminant migration along one of three pathways: surface water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well-managed, its score can be reduced by 20 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the score for the other three categories.

HAZARD ASSESSMENT RATING FORM

NAME OF SITE _____

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site		4		12
B. Distance to nearest well		10		30
C. Land use-zoning within 1 mile radius		3		9
D. Distance to installation boundary		6		18
E. Critical environments within 1 mile radius of site		10		30
F. Water quality of nearest surface water body		6		18
G. Groundwater use of uppermost aquifer		9		27
H. Population served by surface water supply within 3 miles downstream of site		6		18
I. Population served by groundwater supply within 3 miles of site		6		18
Subtotals				180

Receptors subscore (100 x factor score subtotal/maximum score subtotal)

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____

2. Confidence level (C = confirmed, S = suspected) _____

3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix)

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

_____ x _____ = _____

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

_____ x _____ = _____

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
				Subscore
B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.				

1. Surface water migration

Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		24
Subtotals				108

Subscore (100 x factor score subtotal/maximum score subtotal)

2. Flooding		1		3
Subscore (100 x factor score/3)				0

3. Groundwater migration

Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24
Subtotals				114

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway score

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors
Waste Characteristics
Pathways

Total _____ divided by 3 =

Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices factor = Final Score

_____ x _____ =

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels			Multiplier
	0	1	2	
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	10
C. Land use/zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	6
G. Groundwater use of uppermost aquifer	Not used, other sources readily available	Commercial industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	6

11. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

- S = Small quantity (5 tons or 20 drums of liquid)
- M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
- L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels		
	0	1	2
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels
			Sax's Level 3
			Flash point less than 80°F
			Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability, and radioactivity and determine the hazard rating.

Hazard Rating Points

High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
70	M	C	M
	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
	S	S	H
40	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCH + SCH = LCH if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCH designation (60 points). By adding the quantities of each waste, the designation may change to LCH (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Multiplied Point Rating Persistence Criteria

Metals, polycyclic compounds, and halogenated hydrocarbons substituted and other ring compounds
Straight chain hydrocarbons
Easily biodegradable compounds

From Part A by the Following

1.0
0.9
0.8
0.4

C. Physical State Multiplier

Physical state

Liquid
Sludge
Solid

Multiplied Point Total From Parts A and B by the Following

1.0
0.75
0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, groundwater, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	0			1			2			3			Multiplier
	Greater than 1 mile	2,001 feet to a mile	501 feet to 2,000 feet	0 to +5 inches	+5 to +20 inches	Greater than +20 inches	0 to 500 feet	501 feet to 2,000 feet	Greater than +20 inches	Severe	Greater than 50% clay (>10 ⁻⁶ cm/sec)	>3.0 inches	8
Distance to nearest surface water (includes drainage ditches and storm sewers)													
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches										6
Surface erosion	None	Slight	Moderate										8
Surface permeability	0% to 15% clay (>10 ⁻² cm/sec)	15% to 30% clay (10 ⁻² to 10 ⁻⁴ cm/sec)	30% to 50% clay (10 ⁻⁴ to 10 ⁻⁶ cm/sec)										6
Rainfall intensity based on 1-year, 24 hour rainfall (thunderstorms)	<1.0 inch	1.0 to 2.0 inches	2.1 to 3.0 inches										8
	0-5	6-35	36-49										
	0	30	60										

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1
------------	----------------------------	------------------------	-----------------------	-----------------	---

B-3 Potential for Groundwater Contamination

Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay (>10 ⁻⁶ cm/sec)	30% to 50% clay (10 ⁻⁴ to 10 ⁻⁶ cm/sec)	15% to 30% clay 10 ⁻² to 10 ⁻⁴ cm/sec	0% to 15% clay (<10 ⁻² cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high groundwater level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean groundwater level	8
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

<u>Waste Management Practice</u>	<u>Multiplier</u>
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-B-3, then leave blank for calculation of factor score and maximum possible score.



Appendix D

Site Hazard Assessment Rating Forms and Factor Rating Criteria

HAZARD ASSESSMENT RATING FORM

NAME OF SITE POL Storage Area (Site 1)LOCATION Illinois Air National Guard, Springfield, IllinoisDATE OF OPERATION OR OCCURRENCE 1959 to PresentOWNER/OPERATOR 183rd TFG

COMMENTS/DESCRIPTION _____

SITE RATED BY HMTG

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	1	6	6	18
I. Population served by groundwater supply within 3 miles of site	1	6	6	18
Subtotals			99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal)

55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M2. Confidence level (C = confirmed, S = suspected) C3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix)

80

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
---------------	---------------------	------------	--------------	------------------------

- A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore **80**

- B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
Subtotals			66	108

Subscore (100 x factor score subtotal/maximum score subtotal) **61**

2. Flooding	0	1	0	3
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Subscore (100 x factor score/3) **0**

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to groundwater	0	8	0	24
Subtotals			38	114

Subscore (100 x factor score subtotal/maximum score subtotal) **33**

C. Highest pathway score

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore **80**

IV. WASTE MANAGEMENT PRACTICES

- A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	55
Waste Characteristics	80
Pathways	80

Total 215 divided by 3 = 72

Gross Total Score

- B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

72 x 0.95 = **68**

HAZARD ASSESSMENT RATING FORM

NAME OF SITE Old Fire Training Area (Site 2)LOCATION Illinois Air National Guard, Springfield, IllinoisDATE OF OPERATION OR OCCURRENCE 1959 - 1975OWNER/OPERATOR 183rd TFG

COMMENTS/DESCRIPTION _____

SITE RATED BY HMTG

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	1	6	6	18
I. Population served by groundwater supply within 3 miles of site	1	6	6	18
Subtotals			87	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal)

48

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L2. Confidence level (C = confirmed, S = suspected) C3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix)

100

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B
100 x 1.0 = 100

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

100 x 1.0 = 100

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
---------------	---------------------	------------	--------------	------------------------

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore **80**

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
Subtotals			66	108

Subscore (100 x factor score subtotal/maximum score subtotal) **61**

2. Flooding	0	1	0	3
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Subscore (100 x factor score/3) **0**

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to groundwater	0	8	0	24
Subtotals			38	114

Subscore (100 x factor score subtotal/maximum score subtotal) **33**

C. Highest pathway score

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore **80**

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	48
Waste Characteristics	100
Pathways	80

Total 228 divided by 3 = 76

Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

76 x 1.0 = **76**

183rd Tactical Fighter Group
Illinois Air National Guard
Capital Airport
Springfield, Illinois

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

1. RECEPTORS CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
Population within 1,000 feet of site:		
Site No. 1	Greater than 100	3
Site No. 2	0	0
Distance to nearest well:		
Site No. 1	0 - 3000 feet	3
Site No. 2	0 - 3000 feet	3
Land use/zoning within 1 mile radius:	Residential	3
Distance to Base boundary:		
Site No. 1	less than 1000 feet	
Site No. 2	outside Base boundary	3
Critical environments within 1 mile:	Not a critical environment	0
Water quality of nearest surface water body:	Agricultural or industrial	0
Groundwater use of uppermost aquifer:	Drinking water, municipal water available	2
Population served by surface water supply within 3 miles downstream of site:	1 - 50	1
Population served by groundwater supply within 3 miles of site:	1 - 50	1

183rd Tactical Fighter Group
 Illinois Air National Guard
 Capital Airport
 Springfield, Illinois

USAF Hazard Assessment Rating Methodology
 Factor Rating Criteria

2. WASTE CHARACTERISTICS	RATING SCALE LEVELS	NUMERICAL VALUE
Quantity:		
Site No. 1	Moderate quantity	M
Site No. 2	Large quantity	L
Confidence Level:		
Site No. 1	Confirmed	C
Site No. 2	Confirmed	C
Hazard Rating:		
Toxicity		
Site No. 1	Sax Level 3	3
Site No. 2	Sax Level 3	3
Ignitability		
Site No. 1	Flash point less than 80°F	3
Site No. 2	Flash point less than 80°F	3
Radioactivity		
Site No. 1	At or below background levels	0
Site No. 2	At or below background levels	0
Persistence Multiplier:		
Site No. 1	Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Site No. 2	Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Physical State Multiplier:		
Site No. 1	Liquid	1.0
Site No. 2	Liquid	1.0

183rd Tactical Fighter Group
Illinois Air National Guard
Capital Airport
Springfield, Illinois

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

3. PATHWAYS CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
Surface Water Migration:		
Distance to nearest surface water		
Site No. 1	0 to 500 feet	3
Site No. 2	0 to 500 feet	3
Net precipitation	-10 to +5 inches	1
Surface erosion	Slight	1
Surface permeability	30% to 50% clay ($>10^{-4}$ to 10^{-6} cm/sec)	2
Rainfall intensity	2.1 to 3.0 inches	2
Flooding:	Beyond 100-year flood plain	0
Groundwater Migration:		
Depth to groundwater	0 to 10 feet	3
Net precipitation	-10 to +5 inches	1
Soil Permeability	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	1
Subsurface flow	Bottom of site greater than 5 feet above high groundwater level	0
Direct access to groundwater	No evidence of risk	0
4. WASTE MANAGEMENT PRACTICES CATEGORY		
Practice:		
Site No. 1	Limited containment	0.95
Site No. 2	No containment	1.0

Appendix E

Soil Boring Logs

SCALE: ONE INCH EQUALS TWENTY FEET


 B-1

EXISTING
FIRE HOUSE

 B-2

 B-3

EXISTING PARKING LOT

 B-4



 B-5

Ralph Hahn and Associates
Springfield, Illinois

PROJECT NAME
Weapons Calibration Shop and
Fire House Security Bldg.



Boring Location Diagram

PROJECT NO.

020-25036

DATE

January 5, 1983

RECORD OF SUBSURFACE EXPLORATION

Boring No. 1



Project Name: Weapons Calib. Shop and Firehouse Date of Boring: December 20, 1982

Site: Air National Guard, Springfield, IL. Project No.: 020-25036

DESCRIPTION	DEPTH	SAMPLE	N	Q _u	Q _p	M _c	REMARKS
SURFACE ELEV. 582.9							
*NOTE 1		1-AU	--	--	--	12	
Mottled brown Silty CLAY with trace sand (FILL)		2-SS	7	--	1.6	30	
Gray mottled brown Clayey SILT with trace sand (FILL)	5	3-SS	12	--	1.7	26	
Dark brown Silty CLAY with trace sand		4-SS	3	--	0.7	34	24 hr. ▼
							0 hr. ▼
Dark gray mottled brown Silty CLAY with trace sand	10	5-SS	6	0.7	1.0	31	
		6-SS	5	0.7	1.2	29	
Gray mottled brown Silty CLAY with trace sand	15	7-SS	8	0.8	1.5	26	
		8-SS	4	--	0.6	29	
Reddish-brown Silty CLAY with a little sand							
	20	9-SS	69	8.7	4.5+	12	
Brown Clayey SILT with a little sand and gravel		10-SS	63	7.8	4.5+	12	
(WEATHERED TILL)							
**NOTE 2	25	11-SS	50/6"	--	4.5+	10	
END OF BORING							
*NOTE 1: Dark brown Silty CLAY Topsoil with trace sand and organics.							
**NOTE 2: Grayish-brown Clayey SILT with a little sand and gravel. (TILL)							

9772M


RECORD OF SUBSURFACE EXPLORATION

Boring No. 2



Project Name: Weapons Calib. Shop and Firehouse Date of Boring: December 21, 1982

Location: Air National Guard, Springfield, IL. Project No.: 020-25036

DESCRIPTION	DEPTH	SAMPLE	N	Q _u	Q _p	M _c	REMARKS
SURFACE ELEV - 583.7							
*NOTE 1		1-AU	--	--	--	27	
Mottled brown Silty CLAY with trace sand		2-SS	9	--	1.5	26	
(FILL)	5	3-SS	10	--	2.0	24	
*NOTE 2		4-SS	8	2.4	2.0	28	
Mottled gray Clayey SILT with trace sand	10	5-SS	12	2.3	2.7	21	0 hr. 
Grayish-brown mottled brown Clayey SILT with trace sand		6-SS	5	1.4	1.0	25	
Grayish-brown mottled brown Silty CLAY with trace sand	15	7-SS	7	1.2	1.0	26	
END OF BORING							
*NOTE 1: Dark brown Clayey SILT Topsoil with trace sand and organics.							
*NOTE 2: Brownish-gray mottled dark brown Clayey SILT with a little sand (brick fragments) (FILL).							

RECORD OF SUBSURFACE EXPLORATION

Boring No. 3



Project Name: Weapons Calib. Shop and Firehouse Date of Boring: December 20, 1982

Site: Air National Guard, Springfield, IL. Project No.: 020-25036

DESCRIPTION	DEPTH	SAMPLE	N	Q _u	Q _p	M _c	REMARKS
SURFACE ELEV. - 584.2							
*NOTE 1		1-AU	--	--	--	12	
		2-AU	--	--	--	23	
Brownish-gray mottled Silty CLAY with trace sand (FILL)		3-SS	7	--	1.5	23	
Mottled dark brown and brown Silty CLAY with trace sand (FILL)	5						
*NOTE 2		4-ST	--	--	--	30	
Greenish-gray Silty CLAY		5-SS	8	1.5	1.0	28	24 hr.
Grayish-brown mottled brown Silty CLAY with trace sand	10	6-ST	--	--	--	27	
		7-SS	6	0.8	1.0	26	
Grayish-brown mottled brown Silty CLAY with a little sand	15	8-ST	--	--	--	26	
		9-SS	7	0.7	0.5	28	
END OF BORING							
*NOTE 1: 8" of Portland Cement Concrete underlain by 4" of brown coarse to fine GRAVEL with some sand.							
**NOTE 2: Dark brown Silty CLAY with trace of sand.							



RECORD OF SUBSURFACE EXPLORATION

Boring No. 4



Project Name: Weapons Calib. Shop and Firehouse Date of Boring: December 20, 1982

Site: Air National Guard, Springfield, IL. Project No.: 020-25034

DESCRIPTION	DEPTH	SAMPLE	N	Q _u	Q _p	M _c	REMARKS
SURFACE ELEV. - 584.4							
*NOTE 1		1-AU	--	--	--	13	
**NOTE 2		2-AU	--	--	--	24	
Gray mottled brown Silty CLAY with trace sand (FILL)		3-SS	6	0.7	0.5	30	
	5	4-SS	8	2.0	1.0	30	
Greenish-gray mottled dark brown Silty CLAY with trace sand (FILL)		5-SS	8	2.3	2.0	29	24 hr.  0 hr. 
Brownish-gray Clayey SILT with a little sand	10	6-SS	4	0.6	1.0	30	
		7-SS	8	1.9	2.2	25	
Mottled gray Silty CLAY with trace sand	15	8-SS	8	1.4	1.0	23	
		9-SS	10	--	--	--	NO RECOVERY
Grayish-brown mottled brown Silty CLAY with a little sand	20	10-SS	9	2.1	1.8	25	
Mottled brown Clayey SILT with trace sand and gravel (WEATHERED TILL)		11-SS	50/6"	--	4.5+	10	
Grayish-brown Silty CLAY with a little sand and gravel (TILL)	25	12-SS	50/6"	--	4.5+	12	
END OF BORING							
*NOTE 1: 8" of Portland Cement Concrete underlain by 4" of brown coarse to fine GRAVEL with some sand.							
**NOTE 2: Gray mottled dark brown Clayey SILT with a little sand. (FILL)							

RECORD OF SUBSURFACE EXPLORATION

Boring No. 5



Project Name: Weapons Calib. Shop and Firehouse

Date of Boring: December 21, 1982

Site: Air National Guard, Springfield, IL.

Project No.: 020-25034


DESCRIPTION	DEPTH	SAMPLE	N	Q _u	Q _p	M _c	REMARKS
SURFACE ELEV. - 584.7							
*NOTE 1		1-AU	--	--	--	32	
Mottled brown Silty CLAY with trace sand and organics (FILL)		2-SS	7	--	1.0	26	
Mottled gray and brown Clayey SILT with trace sand (FILL)	5	3-SS	6	0.8	--	28	
Mottled gray and brown Silty CLAY with trace sand (FILL)		4-SS	6	2.5	2.2	27	
Dark brown Clayey SILT with trace sand and organics	10	5-SS	6	1.6	1.5	26	
Mottled brownish-gray Silty CLAY with trace sand		6-SS	3	0.7	0.5	33	
	15	7-SS	4	1.7	1.3	30	0 hr.
Mottled gray Silty CLAY with trace sand							
Mottled brown Clayey SILT with a little sand and trace gravel (WEATHERED TILL)	20	8-SS	31	--	4.5	15	
Grayish-brown mottled brown Clayey SILT with a little sand and gravel (SLIGHTLY WEATHERED TILL)	25	9-SS	87	4.2	4.5+	12	
Gray Clayey SILT with a little sand and gravel (TILL)	30	10-SS	50/6"	7.4	4.5+	13	
END OF BORING							
*NOTE 1: Dark brown Clayey SILT topsoil with trace sand and organics.							

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

- N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split-spoon.
- Qu: Unconfined compressive strength, TSF
- Qp: Peneirometer value, unconfined compressive strength, TSF
- Mc: Water content, %
- LL: Liquid limit, %
- PI: Plasticity Index, %
- δd : Natural dry density, PCF
- : Apparent groundwater level at time noted after completion.

DRILLING AND SAMPLING SYMBOLS

- SS: Split-spoon - 1 3/8" I.D., 2" O.D., except where noted.
- ST: Shelby Tube - 3" O.D., except where noted.
- AU: Auger sample.
- DB: Diamond Bit.
- CB: Carbide Bit.
- WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

<u>TERM (NON-COHESIVE SOILS)</u>	<u>STANDARD PENETRATION RESISTANCE</u>
Very Loose	0 - 2
Loose	2 - 4
Slightly Compact	4 - 8
Medium Dense	8 - 16
Dense	16 - 26
Very Dense	Over 26
<u>TERM (COHESIVE SOILS)</u>	<u>Qu - (TSF)</u>
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00 +

PARTICLE SIZE

Boulders	8 in. +	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	02.mm-0.074mm		

Appendix F
Underground Storage
Tank Inventory

Underground Storage Tank Inventory
183rd Tactical Fighter Group, Illinois Air National Guard
Capital Airport, Springfield, Illinois

Base Tank ID#	W-1	W-3	104	F-8	F-12	W-12	F-16
Location	Bldg P1	Bldg P3	Bldg P5	Bldg P8	Bldg P12	Bldg P12	Bldg P16
Capacity (gallons)	560	560	2,000	1,000	1,000	500	3,000
Contents	waste oil	waste oil	JP-4	#2 fuel oil	#2 fuel oil	waste oil	#2 fuel oil
Year Installed	1975	1987	1959	1959	1961	1961	1975
Material of Construction	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Coatings							
A. Interior	A. uncoated	A. uncoated	A. unknown	A. unknown	A. unknown	A. unknown	A. unknown
B. Exterior	B. unknown	B. Bitumen	B. unknown	B. Bitumen	B. unknown	B. unknown	B. Bitumen
Cathodic Protection	None	None	None	None	None	None	Yes
Status of Tank (year abandoned)	Active	Active	Active	Active	Active	Active	Active

Underground Storage Tank Inventory (continued)
183rd Tactical Fighter Group, Illinois Air National Guard
Capital Airport, Springfield, Illinois

Base Tank ID#	S-17	F-17	103-1	103-2	103-3	103-4	F-18
Location	Bldg P17	Bldg P17	POL	POL	POL	POL	Bldg P18
Capacity (gallons)	560	4,000	25,000	25,000	25,000	25,000	300
Contents	Aircraft cleaning solvent	#2 fuel oil	JP-4	JP-4	JP-4	JP-4	#2 fuel oil
Year Installed	1977	1977	1954	1954	1954	1954	1977
Material of Construction	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Coatings							
A. Interior	A. unknown	A. uncoated	A. Epoxy	A. Epoxy	A. Epoxy	A. Epoxy	A. unknown
B. Exterior	B. Bitumen	B. Bitumen	B. unknown	B. unknown	B. unknown	B. unknown	B. Bitumen
Cathodic Protection	None	None	None	None	None	None	None
Status of Tank (year abandoned)	Active	Active	Active*	Active*	Active*	Active*	Active

NOTES

* Scheduled for removal Spring 1990.

Underground Storage Tank Inventory (continued)
183rd Tactical Fighter Group, Illinois Air National Guard
Capital Airport, Springfield, Illinois

Base Tank ID#	103-5	103-6	F-6	F-23	S-23	W-23	F-19
Location	POL	POL	Bldg P6	Bldg P23	Bldg P23	Bldg P23	Bldg P19
Capacity (gallons)	25,000	25,000	1,000	10,000	500	500	4,000
Contents	JP-4	JP-4	#2 fuel oil	#2 fuel oil	PD 680	used PD 680	#2 fuel oil
Year Installed	1981	1981	1984	1980	1980	1980	1977
Material of Construction	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Coatings							
A. Interior	A. Epoxy	A. Epoxy	A. unknown	A. unknown	A. unknown	A. unknown	A. Epoxy
B. Exterior	B. asphaltic	B. asphaltic	B. unknown	B. Bitumen	B. Bitumen	B. Bitumen	B. Bitumen
Cathodic Protection	Yes	Yes	None	Yes	Yes	Yes	Yes
Status of Tank (year abandoned)	Active	Active	Active	Removed 1989*	Removed 1989*	Removed 1989*	Active

NOTES

* Removal witnessed by State Fire Marshal. No leaks/no ground contamination.

Underground Storage Tank Inventory (continued)
183rd Tactical Fighter Group, Illinois Air National Guard
Capital Airport, Springfield, Illinois

Base Tank ID#	W-19	124-2	124-1	W-126	103-7	W-17-1	W-17-2
Location	Bldg P19	Bldg P19	Bldg P19	Bldg P126	POL*	Bldg P17	Bldg P17
Capacity (gallons)	560	3,000	3,000	560	1625	500	300
Contents	waste oil	diesel fuel	gasoline	waste oil	JP-4	used JP-4	waste oil
Year Installed	1977	1979	1979	1984	1981	1977	1977
Material of Construction	Steel	Steel	Steel	Fiberglass	Fiberglass	Steel	Steel
Coatings							
A. Interior	A. unknown	A. unknown	A. unknown	A. uncoated	A. uncoated	A. uncoated	A. uncoated
B. Exterior	B. Bitumen	B. Bitumen	B. Bitumen	B. uncoated	B. uncoated	B. Bitumen	B. Bitumen
Cathodic Protection	None	Yes	Yes	None	None	None	None
Status of Tank (year abandoned)	Active	Active	Active	Active	Active	Active	Active

NOTES

* Underground piping